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THE CANADIAN

ENTOMOLOGIST.

VOLUME XIII.

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TO OUR READERS.

A happy greeting to all. That the year may bring prosperity in its train to every one of our members is our sincere wish. We enter on our thirteenth year with confidence; long experience of the sincerity of the friendship and heartiness of support of our many friends and contributors in the past, inspires trust for the future—a trust which, we feel sure, will not prove misplaced. We want the cordial support of all to make our journal for 1881 more useful and more widely read than it has ever been before. We hope to hear from all our old friends and many new ones. Please send in your subscriptions promptly to the Secretary.

ENTOMOLOGY FOR BEGINNERS.

BY THE EDITOR.

The Indian Cetonia: Euryomia inda.

This is a stout, hairy beetle (fig. 1) which makes its appearance early in spring, usually towards the end of April or beginning of May, flying about in open fields and about the borders of woods, with a loud buzzing sound, resembling that of a bumble bee. It belongs to the flower beetles, most of whom live on pollen and the honey of flowers, and are fond of sweets.

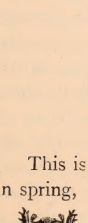

Fig. 1.

This insect is of a brownish-gray color, dotted and spotted with blackish and thickly covered with short greenish-yellow hairs. It measures half an inch or more in length. During the summer it disappears, but a second brood comes out in the fall, usually during September, when they may be found feeding on the pollen of flowers and also upon the sweet sap of plants and trees. Not content with this, they attack our finest and most luscious fruits, eating their way into the richest ripening pears and burrowing into the finest peaches so deeply that only the tips of their bodies are visible, and in this way spoil-

ing the fruit and inducing rapid decay. They also attack grapes and other sweet fruits.

The Abbot Sphinx: Thyreus Abbotii.

This very pretty Sphinx moth has in the past been very rarely met with in Canada; it seems, however, to be gradually spreading and becoming more common with us. It was first taken some years ago in the neighborhood of Hamilton, and is now reported as quite common there. This season a specimen has been captured in London by Mr. J. M. Denton, the first recorded capture in this neighborhood.

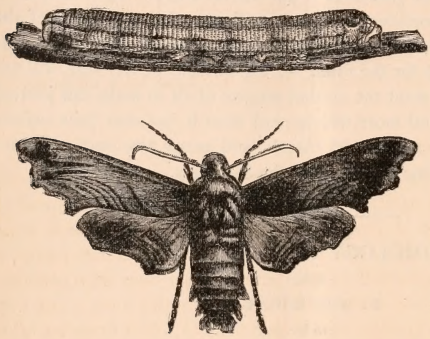

Fig. 2.

The caterpillar (see fig. 2) is found on the grape vine and also on the Virginia creeper (*Ampelopsis quinquefolia*), feeding on the leaves of both these vines. In color it varies from a dirty yellowish to a reddish-brown, marked transversely with fine black lines and longitudinally with patches of dark brown. There is also a dark line along each side. In place of the horn at the hinder extremity of the body which usually adorns the caterpillars belonging to the Sphinx family, there is in this instance nothing more than a polished knob or tubercle. The under side is paler than the upper, with a reddish tinge along the middle. The moth (fig. 2) is very pretty and adorned with soft rich colors. The fore wings are pale brown, variegated with brown of a deeper and richer shade. The hind wings are yellow with a broad blackish border; both wings are notched on the margin. There is but one brood of the moths each year, and they appear about the time the Lilacs are in bloom in the spring.

The winter is passed in the chrysalis state. When the larva is full grown it descends to the ground and constructs a rough cocoon on or near the surface in some sheltered spot, and within this changes to a blackish-brown chrysalis.

OBSERVATIONS ON SEVERAL SPECIES OF AEGERIADÆ INHABITING THE VICINITY OF BUFFALO, N. Y.

BY D. S. KELLICOTT, BUFFALO, N. Y.

In this communication it is my purpose to record such of my observations on some local species of the "clear-wings" as it is deemed are real contributions to our knowledge of the group. I shall say more or less about the following species: *Aegeria tricincta*, *pini* n. s., *pictipes*, *acerni*, *pyri*, *tipuliformis*, *exitiosa* and *Trochilium denudatum*. There are other species known in our fauna, but these only have been encountered in the fields.

Aegeria tricincta Harris.

During June and July last I obtained several examples of this moth from larvæ secured in April. These larvæ were taken from branches, suckers and small trunks of *Populus candicans* growing on low lands along the Niagara below the city. The smaller ones were sometimes found in the sap-wood or just beneath the bark, but the larger ones were generally in the centre or pith of the stems; on the smaller stalks they cause considerable galls, quite as prominent as those upon the willow branches made by the larva of the Tortrix, very abundant in the same locality. These poplars are badly infested by the larvæ of *Saperda moesta*, and I am of the opinion that the moth places her eggs in the deserted burrows of the beetle, the young caterpillars thus easily gaining access to the wood, its home for at least a year. The swellings on the branches caused by the beetle become more enlarged by a second occupation. I have taken them from the stem just above ground, and from limbs of trees many feet high.

The larvæ, when taken, April 15, were of two distinct sizes, the larger measuring from .9 to 1.1 of an inch in length, the smaller .5 of an inch and less. The former appeared to increase but slightly before pupation. The color is dull white with a darker line along the dorsum; head quite strongly bilobed, light brown, jaws and clypeus black; the first ring smooth, slightly clouded with brown, two irregular oblique marks from posterior border outwards to front edge. Body somewhat attenuated toward either end; transverse wrinkles, especially on thoracic rings, well marked; in the small ones there is a slight medio-dorsal indenture; there are also lateral sub-stigmatal wrinkles. Stigmata elliptical, brown, last pair large,

placed sub-dorsally and posteriorly. Above the anal feet, directed backwards, *there are two black chitinous teeth;* in the younger specimens they are more prominent and upturned. The scanty brown hairs arise from slight papillæ.

The larva before transforming prepares a way for final escape which it carefully guards by means of a silken membrane, reinforced by fragments of wood; it then lines its burrow with silk and spins a firm cocoon about itself.

The pupa is light brown. The clypeus is armed with a sharp wedge-shaped process, strengthened by ridges at its four angles and also by a median dorsal ridge. The abdominal rings are furnished, as usual, with two transverse rows of teeth, except the anal and pre-anal segments, which have but one row each. The terminal ring is obliquely truncated, bearing several teeth. Length .6 of an inch.

The moth is described by Harris in Silliman's Journal, Vol. 36, 310, as follows:

"Blue black; fore wings opaque; hind wings transparent, with the border, fringe and transverse line near the middle black; palpi at tip, collar, a spot on each shoulder, and three bands on the abdomen yellow; antennæ short, black; the four posterior tibiæ banded with orange; tarsi yellow tipped with black; tail flat with two longitudinal yellow lines. Expands from 1 to 1⅛ inch."

He says further that "this species seems to come near the European *asiliformis*, but the male has only two abdominal bands, while *asiliformis* male has five."

I am able to add the differences between the sexes and to mention some characteristic marks not referred to above. The male is considerably smaller; the antennæ are strongly pectinated to the apical portion, which is smooth and enlarged to nearly twice the diameter of the middle part; the processes of the joints are hairy with a long fascicle at the apex; the minute apical cone also bears a fascicle of hairs. The antennæ are blue black and scaled above, below pale bay. The abdomen has *four* yellow bands. No "longitudinal yellow lines in the tail." Both sexes have a conspicuous white spot bordering the eye in front; four small yellow spots on the upper part of the thorax; two below the base of fore wings, also a yellow line at the outer edges of the collar; the outer edge of the coxæ of the first pair of legs, also those of the second and third pairs are of the same color. The fore

wings are more or less washed with red on the basal third. The second abdominal band alone appears on the ventral side ; in front of it below is a yellow line.

I have not seen the European *asiliformis (bespiformis*, Br. Mus. Lists viii., 14), but have carefully compared our species with the descriptions of Stephens (Haust. vol. 1, 139) and Walker, and find the closest agreement, except perhaps in the coloration of the legs, and in size ; *tricincta* is a little larger. Besides, Stephens says *asiliformis* is "occasionally taken on poplars near London in June."

I can not omit mentioning the very close mimicry of *tricincta* after certain wasps ; it is so close that different persons to whom it was shown when alive pronounced it a wasp, and this, too, after being cautioned that a hasty conclusion might put reason to the hazard. This close mimicry results from their form and color, in general hue, abdominal bands, thoracic and head markings ; also by their motions and attitudes, the buzzing of their wings, the alternate up and down strokes of their antennæ, the position of their wings at rest, their threatening attitude when disturbed, etc. These are often sufficient to deceive even a practiced eye.

AEGERIA PINI, n. s.

When studying the larval habits of *Pinipestis Zimmermani* in 1878–9, I met with the larva and pupa skins of two moths evidently different from the pine pest, yet having quite similar larval habits. During the past summer I succeeded in getting the moth of one of them ; it is an Aegerian, as I think, undescribed, but I would not venture upon describing it had I only the imago ; but as I am able to give mainly its history, and having done so much tramping and climbing for its sake that I have come to feel a proprietary right, I undertake to name and describe it as new. As its proposed name implies, the larva inhabits the Pine, boring under the bark and into the superficial layers of the wood. From the wounds thus made pitch exudes, which through the action of the larva and the warmth of the sun forms hemispherical masses over its burrows ; in these masses the pupa cells are finally prepared and the inactive stage passed. The larva occurs more frequently than elsewhere just below a branch ; sometimes about the border of a wound made by the axe or where a limb has been wrenched off by the wind ; rarely in the axil of the branch. It appears to attack larger trees than the Zimmerman's pine pest, and more fre-

quently occurs at considerable altitude. I have taken them thirty to forty feet from the ground. While they sometimes, perhaps as a rule, take advantage of the broken cortex, I have found them where it appeared that they had worked through the same into the soft layer.

I have found the larva in the following localities: Hastings Center, N. Y.; Portage, N. Y.; Buffalo, N. Y. (?); Point Abino, Ontario. At the first named place they were found in several instances numerous enough to seriously injure trees of moderate growth.*

I have taken the larvæ in autumn from .25 to .75 of an inch in length; they finally attain a length of 1 to 1.1 inch; diameter quite uniform, .18 of an inch. Color white; head light brown, flattened; first thoracic ring slightly clouded with brown, smooth; no trace of an anal shield; true legs scarcely colored, pro-legs prominent crowned with two rows of about eight hooks each. The brown hairs arise from papillæ, the base of each hair being surrounded by a brown annulation. The spiracles are but slightly elliptical, last pair large, placed sub-dorsally.

Before transforming they prepare a cell in the extruded pitch mingled with their *debris;* this they line with silk, but spin no other cocoon. While in their burrows they move through the soft pitch with impunity, but if removed from the same they soon die from the encumbrance of the hardening pitch adhering to them.

I have found the pupa the last of May; the moth appears from the middle to the end of June. It may be that others come in July and August, for I have found larvæ apparently full grown in July. On the 15th of July I brought to my rooms devoted to the rearing of insects, some blocks of wood containing such apparently mature larvæ, expecting them to complete their transformations in a few weeks at most; they are still in their pitch cells unchanged (Nov.) Is it a case of retarded development due to the drying of the bark and wood?

The pupa has a length of .73 of an inch. Color light brown with the extremities dark. Over the dorsal portion of the abdominal rings are the usual rows of teeth; those on the anterior margins scarcely extend below the spiracles. The clypeus is without a pointed process; the mediodorsal ridge of the thorax is unusually prominent.

* For definite direction to collectors I mention Mallory, a station near Hastings Center, on the Syracuse Northern Railway, where they may be found in force in pines thirty rods south from the station.

When about to transform it bores through the pitch wall and escapes, leaving the pupa skin protruding.

The moth (female) expands 1.2 inch. Fore wings opaque; hind wings transparent. Color blue black as follows: fore wings, the clothed portions of hind wings, head, palpi, thorax, upper part of abdomen, antennæ and legs. The neck fringe and the sides of the collar are orange, also the ventral side of the abdomen and the tail fringes. The antennæ are long, slightly enlarged toward the end; there is a decided orange line on the under side of the antennæ for one-third their length; the tarsi are smoky. The male not seen.

Aegeria pictipes G and R.

I have found this species common enough at Buffalo wherever there are old plum trees. In some instances I have found it doing grave injury. It works also in the cherry trees. Its history has been given recently by Dr. J. S. Bailey (North Am. Ent., I, 17) with so much exactness that any further notice here seems unnecessary. I make mention, however, of finding *pictipes* in the wild black-cherry (*Prunus serotina*) and the wild red-cherry (*P. Pennsylvanica*) in June and July last, at Hastings Center, N. Y. Numerous larvæ and pupæ were taken from beneath the bark; imagines were taken flying about the trunks.

Aegeria acerni Clemens, likewise has been carefully described by Mr. C. V. Riley in the Mo. Ent. Rept., vi., 107. He says, however, that the pupa is unarmed, which is not the case with those obtained here, if "unarmed" refers either to the dorso-abdominal teeth or to the corneous pointed clypeus. The larvæ of this moth are annually doing much damage to the hard maples (*Acer saccharinum*), planted so generally in this city for shade; they are less destructive to the soft maple (*A. rubrum*). It appears that they seldom attack uninjured trees, but depend upon accidents to afford them opportunity to enter the inner bark and superficial wood: when once established they keep at the scar or wound year after year, thus preventing recovery and causing the trunks to become rough and unsightly; in many cases the trees are thus almost ruined. The moths appear most numerously from May 20th to June 15th. I have not been able to find, after patient search, this borer in our forest maples.

Exitiosa and *tipuliformis* are both sufficiently abundant in this vicinity to be destructive to peach tree and currant bush. I have imagines of the former which escaped late in September from chrysalids given me by Mr.

C. D. Zimmerman, so the moth does appear from early summer until autumn. Mr. A. S. Fuller (Am. Ent. vol. 1, N. S., page 11) believes that "the grubs go a much greater distance from their burrows before passing into pupa state than is generally supposed." This from the fact that he found "at various times during the summer in almond trees larvae of all sizes and no pupae." I have rarely found their cocoons at any distance from their burrows, frequently in them covered with gum or bark. From observations on other species it appears that larvae apparently full grown at midsummer may hybernate without changing.

Fyri is a rare form here, so far as ascertained after search and inquiry.

Trochilium denudatum Harris is also rare; June 9th last I found one pupa skin, presumably of this species, protruding from an ash shade tree in this city, but no further evidence of its presence could be obtained. I have one moth taken here June 13th, which is doubtfully referred to this species.

NOTES ON COCCIDÆ.

BY J. HENRY COMSTOCK, WASHINGTON, D. C.

There occurs in certain orange groves in southern California a species of *Aspidiotus* which infests the bark, leaves and fruit of the orange and which from the extent of its ravages has created great alarm. This insect is popularly known by the fruit growers of that section as the red scale, although this name does not well describe its color. This species as yet occurs in only a few of the Californian orange groves, but is more to be feared than any other scale insect. I have conclusive evidence that it was introduced into that State from Australia. It is, I believe, as yet undescribed, and I offer the following diagnosis:

ASPIDIOTUS CITRI, n. sp. *Scale of the female.*—The scale of the female in outline is much flattened, varying in color from a light brownish gray to a bright reddish brown. In fresh specimens there is a white nipple-like prominence which is nearly central and is the remains of a tuft of cottony excretion, beneath which the first larval skin was shed; surrounding this and occupying one third of the diameter of the scale is a

ring which is slightly darker than the remainder of the scale and indicates the position of the second larval moult.

Female.—The female is light yellow in color in the adolescent stages, becoming brownish as it reaches maturity. When fully developed the thorax extends backward in a large rounded lobe on each side, projecting beyond the extremity of the abdomen, giving the body a reniform shape.

Scale of male.—The scale of the male resembles that of the female, excepting that it is only one fourth as large, and the posterior side is prolonged into a flap which is quite thin.

Male.—The male is light yellow; thoracic band brown; eyes purplish black.

The species described by Mr. Ashmead in the November number of the American Entomologist under the name of *Chrysomphalus ficus* Riley MS. is simply a species of *Aspidiotus;* and is not that known as the red scale in California, as is indicated by Mr. Ashmead. Although I have carefully explored many orange groves both in Florida and California, and have had extensive correspondence with orange growers, I have been unable to find *Aspidiotus ficus* in the last named State, and only in a single grove in Florida. Here it was first observed by Mr. G. M. Holmes on some sour orange trees imported from Cuba. On sending specimens of it to a friend at Havana, I received others from that place and the information that it is a very common species in the public gardens of that city. The species can easily be distinguished from *Aspidiotus citri* by an examination of the scale alone, which is much darker, being sometimes almost black.

DESCRIPTION OF THE PREPARATORY STAGES OF PAPILIO PHILENOR, Linn.

BY W. H. EDWARDS, COALBURGH, W. VA.

EGG—Spherical; the surface much covered with a rough crust which rises to a summit, either small and pointed, or rather large and truncated; the sides of this crust irregularly melon-ribbed; color of surface russet, of the crust bright ferruginous. Duration of this stage 7 to 9 days.

YOUNG LARVA—Length .58 inch; cylindrical, thickest anteriorly and tapering from 2 to 13; color ferruginous; marked longitudinally by many rows of low, conical, black tubercles, each of which sends out a black hair, and a few on the side on anterior segments several hairs; of these rows four are dorsal, two being close together on either side of dorsum, and they run from 3 to 13; three are lateral, the upper two being on upper and middle part of side, and running from 5 to 12; the lower, or infra-stigmatal row, from 2 to 12; besides these are two short rows, one of two small tubercles on segments 3 and 4, placed a little below dorsals, the other of three on 2, 3 and 4, between the lines of the upper two long rows; on 2 is a dorsal chitinous band, with five concolored tuberculous points and hairs on each side; feet black, pro-legs red-brown; head obovoid, a little depressed at top, shining black, with many black hairs.

As this stage proceeded a change in the appearance of the larva took place, and shortly before the next moult this reached its height. The tubercles of the two outermost of the dorsal rows became prominent and conical, the tops crowned by the black shields which at first had been at the surface of the body. Seen lengthwise these two rows now formed elevated, sharp ridges. The tubercles of the two inner dorsal rows rose scarcely if any at all, and were almost within the bases of the other rows and stood a little in advance of them. The tubercles of the second short row on 2, 3, 4 became still more prominent, that on 2 especially, and it was turned forward so that its end was even with the front of the head. At same time one tubercle of the upper lateral row, viz., that on 5, and one of middle row, viz., that on 6, also became prominent, and these five all gave out several divergent hairs from their summits; so the remainder of second lateral row gave out three hairs, the other tubercles but one hair each. To first moult from 4 to 9 days according to the season.

After 1st Moult—Length .12 inch, same general shape; color red-brown; at the outer edge of dorsal area on either side, corresponding to outer dorsal row of first stage, is a row of fleshy appendages, one to each segment from 3 to 13; these are thick, tapering, bluntly rounded at top, and from base up are beset with short black hairs; those on 3, 4, 5 are longest, next those on 11 to 13, the others are short; on the lower part of side on 2 to 4 and on 6 is a demi-row of similar appendages, the two anterior ones longer than any dorsal, and the pair on 2 turned forward so that the tips are about even with front of head; on 5, a little above the line above this demi-row, is another but very short tubercle; over the legs

from 7 to 10 and continued to 11 and 12 is another demi-row, all very short and pointing downward: (this arrangemen of the appendages continues to last larval stage); the dorsals are reddish, with a fiery glow, the others are color of body: 2 has a chitinous patch with fine tubercles and hairs; under side darker brown; head subcordate, flattened frontally, surface black, shining, much covered with fine and short black hairs. Duration of this stage 3 to 4 days.

After 2nd Moult—Length .22 inch; shape much as before, the segments well rounded, each having one or two vertical depressions on the side; color chocolate-brown, with a reddish tint: the appendages on side of 2 much elongated, measuring .04 inch, and as the stage progresses reaching .08 in.; the dorsals on 3 to 5 and 11 to 13 are longest, subconic; more or less of these dorsals are fiery red, sometimes a single pair, and so to four or five pairs, and the others have a dull red line: head as before. To next moult 3 to 4 days.

After 3rd Moult—Length .6 inch; color silky black-brown; the dorsal appendages from 5 to 11 are bright red; the front of the ridge on 2 is of same red; the dorsals on 11 and 12 are curved forward; the long side spur on 2 is now .16 inch, tapering and flexible. To next moult 4 to 5 days.

After 4th Moult—Length .8 inch; color now silky-black; as the stage proceeds it changes to dark brown, and loses much of its gloss. At about five days after the moult the larva reaches maturity.

MATURE LARVA—Length at rest 1.6 in., in motion 1.8 inch; color uniform black-brown; shape cylindrical, thickest at 4 and 5; each segment curved, the highest point being in the line of the appendages, or a little back of the middle of the segment; furnished with several rows of fleshy tapering appendages, bluntly rounded at top, and disposed as before described under the first moult; these are mostly concolored with the body, and are thickly beset with short black hairs; the dorsals on 3 to 5 are moderately long, on 11 to 13 long, and the two last are bent forward; the rest are short; from 3 to 10 they are bright yellow or sometimes orange-red; of the anterior demi-row, the one on 2 measures about .34 inch and is slender, tapering, flexible, and is moved much like an antenna; the one on 3 is scarcely half as long as the other, and the two on 4 and 6 are shorter still and equal; on 5 resembles the short dorsals and is colored like them, either yellow or red; those of the posterior and lower demi-row are bent down, and when the larva is at rest have their

extremities even with the claspers ; segment 2 is broad, covered dorsally by a chitinous patch which is surrounded mostly by a fleshy ridge ; on its anterior side is a yellow or red patch ; surface of body smooth, but with one or two vertical creases to each segment and some depressions near the summit ; under side brown ; feet black, legs brown ; head sub-cordate, flattened in front, the depression at top slight, the vertices not being much elevated ; color dull black, much covered with short black hairs. At 8 days from 4th moult the larva suspended, and in two days thereafter pupated (in August).

CHRYSALIS—Length 1.1 inch ; the abdomen anteriorly very broad, measuring .34 inch ; the thoracic segments narrow ; bent in a double curve, the head and thorax being thrown back, the abdomen arched and turned down at end ; head case much produced, narrow, widening at top, compressed transversely and bevelled roundly and equally to a sharp transverse ridge, the top of which is a little incurved ; the sides at top triangular and at the edges ridged ; at base of head case on either side is a small pyramidal projection ; mesonotum high, rounded, and having on the summit an elevated, three-cornered process, rounded bluntly at top, the sides excavated so as to form three sharp ridges, two across and one, on upper side, in medio-dorsal line ; the wing cases flaring, especially on lower half, the middle being depressed ; on the abdomen are two sub-dorsal ridges, on each of three segments produced to a high thin circular appendage ; on either side of abdomen a low ridge ; color variable, being either wood brown, finely veined or reticulated with darker, the ventral side of uniform hue ; the top of head case, mesonotum and dorsal side of abdomen being a little yellowish, all the ridges being darker ; at base of head case on dorsal side, and along the edges of the wing cases, is a sprinkling of small deep yellow spots and points. Or the general color is green, which prevails over the whole ventral side, the ridges everywhere being of a darker green ; the mesonotum yellow-green, and all below to end of abdomen light yellow ; a yellow patch at base of head case, which sometimes includes a crimson spot ; and sometimes, on either side of mesonotum, is a small round crimson spot. Duration of this stage 15 days.

Philenor is a very common butterfly in this region, to be seen from early spring to frost, in successive broods, and yet I rarely find its caterpillar. Aristolochia, the vine upon which it feeds, is not rare in our forests, but is confined to them. Undoubtedly the caterpillar feeds on

some other plant, as Mr. Mead observed a female ovipositing on the leaves of a slender, low-growing vine in a thicket near my house, some years ago. We neglected at the time to ascertain the name of this vine and I have since been unable to re-discover it, or to find any plant except Aristolochia upon which the larvæ in confinement would feed. Abbot figures Aristolochia *serpentaria* as the food plant of this species, and Dr. Boisduval says the butterfly is found especially where A. *serpentaria* grows. The larvæ feed upon A. *sipho* as readily. An old and very large vine of this species covered the front of the house in which I formerly resided at Newburgh, N. Y., and every year was nearly denuded of its leaves by caterpillars of *Philenor*. How much further north the butterfly lives I am not advised, but to the south and southwest, and on the Pacific coast, it is abundant. So also throughout tropical America and in the West Indies. The eggs are laid in one or two rows of from five to ten in the row, on the under side of the leaves, and are not close together, but separated by narrow spaces. The young larvæ betake themselves to the edge of the leaf, and ranging themselves at right angles to this, side by side, feed after the manner of the large Bombycidæ. No other species of N. American Papilio with whose early stages I am acquainted has this gregarious habit. This continues till they are half grown, when they separate. They are very active in their movements, far more so than any other of our Papilio larvæ, and can travel with great rapidity, and when in motion constantly vibrate their long, flexible, antennæ-like appendages. I have found them somewhat cannibalistic in their propensities, devouring each other at times, when the lack of proper food was not the occasion of it.

I have been in error for several years as to the number of larval moults of *Philenor*, and several times have spoken of the species as exceptional in this respect—as having five moults, when all our other Papilios have but four. And suspecting a mistake, I have taken great care to ascertain the fact the past season. There are but four moults, as hereinbefore described. The figure of the larva of *Philenor* in Abbot is fairly correct, but the chrysalis is much out of drawing. Boisduval and LeConte profess to have figured after Abbot, but the larva cannot have been copied from the Insects of Georgia. It is absurdly wrong. There is no sign of the demi-row of lateral appendages, and the long pair on segment 2, which should form part of this row, appear to come from the dorsum, and look like the prongs of a thorn-locust tree. There is also given a lateral row of red knobs like those on dorsum, and which have

no existence in nature. The chrysalis also is badly done, and instead of the broad bevelled ridge at top of head case, we see a square flat-topped process, much like a wooden plug driven into the head.

NORTH AMERICAN MOTHS.

BY A. R. GROTE.

(Continued from Page 258, vol. xii.)

Graphiphora agrotiformis, n. s.

♀. This form reminds one of *Agrotis collaris* or *versipellis.* Eyes hairy; tibiæ unarmed; tuftings obsolete. Fore wings blackish brown to the continuous, black, upright, uneven subterminal line; beyond with the fringes brownish. Median lines geminate, faint. Orbicular round, paler than the wing; reniform moderate, outwardly excavate, upright, pale-ringed with dark centre; the cell between the spots black-shaded; the stigmata are comparatively small. No trace of the claviform. Hind wings pale brownish fuscous, concolorous; fringes a little lighter and more reddish. Beneath secondaries paler, with discal dot and uneven exterior line; fore wings dark fuscous to terminal space, which is pale with the fringes dark. Head and thorax like the fore wings; collar a little paler. Body rather slender; costa of primaries a little depressed centrally. Colorado; expands 34 mil. Differs from the described species quite strongly; from *Mamestra* by the untufted body parts.

Heliophila oxygala, n. s.

Allied to *pallens.* Fore wings light yellowish ochrey; the interspaces beyond the cell and below the median vein indeterminately shaded with blackish. The veins paler; a small black dot at the end of the cell alongside of the median vein. The outer line reduced to a small black dot on vein 2 and vein 5. Fringes concolorous. Hind wings blackish fuscous, a little paler at base; fringes pale. Beneath both wings shaded with fuscous, leaving the costa of primaries and the fringes pale. Breast shaded with fuscous; thorax and abdomen yellowish ochrey. This species is more yellowish than *pallens*, with the fore wings shaded with

blackish. Eyes hairy: clypeus smooth. Expands 32 mil. Colorado. One specimen in Mr. Tepper's collection, one ♂ in my own.

Under the name *obusta*. I believe that Guenée has described a form of *pseudargyria* in which the primaries are suffused with *red*.

Heliophila flabilis, n. s.

♂. Very pale ochrey or straw color shaded with fuscous. The pale longitudinal shades extend along the cell over the interspace between veins 5 and 6 nearly to the margin; a short pale shade on the interspace above and extending nearer to the margin. From the base a wide submesial pale shading extends outwardly to the margin. A black dot marks the reniform at median vein; an extra-mesial row of dots on the nervules, not prominent. The veins are indistinctly paler. The darkest portion of the wing is along the median vein, and a fine black streak runs along the interspace between veins 4 and 5. Hind wings whitish, vaguely soiled with fuscous exteriorly. Thorax concolorous with primaries; no lines on the collar. Beneath without marks. This species recalls in ornamentation *lapidaria*, but is more diffusely shaded; the outer line of spots more numerous, the hind wings darker, the body more slender. Eyes hairy; clypeus smooth. Long Island, near the sea shore, in May; Mr. Tepper. Expands 33 mil.

Heliophila farcta, n. s.

♂. Allied to *adjuta* and *lapidaria*, but much stouter. Fore wings unicolorous pale ochrey with a warm or reddish tinge and without longitudinal shadings. Median vein paler. A dot on vein 2 and one on vein 5 indicate the extra mesial line. A small faint dark shade subterminally about vein 5 opposite the cell. Hind wings white with slightly ochrey fringes; no marks above and beneath. Collar lined. Head and thorax concolorous with primaries; femora darker within. Eyes hairy. Length of primary 19 mil. California, Mr. Hy. Edwards, No. 168.

The following is a list of the North American species of *Tarache* (Acontia), as far as known to me. I have seen the type of *obatra* Morrison; it appeared to me to belong to *Sprayueia*. The new variety *virginalis* differs from the type by the absence of the subterminal blackish shading on the primaries.

1. *crustaria* Morrison, Proc. Ac. N. S. Phil., 70, 1875. Colorado; Nebraska.

2. *flavipennis* Grote, Bull. B. S. N. S., 1, 153. California ; Oregon.
3. *aprica* Hubn. 371 ; Guen. Noct. 2, 219 ; Var. *biplaga* Guen., Noct. 2, 218. Southern States.
4. *abdominalis* Grote, Can. Ent., 9, 157. Texas.
5. *lanceolata* Grote, Can. Ent., 11, 198. Texas.
6. *angustipennis* Grote, Proc. Ac. N. S. Phil., 426, 1875. Texas ; Colorado ; Calif.
7. *sutrix* Grote, Can. Ent., 12, 154. Colorado ; Nevada.
8. *tenuicula* Morrison, Proc. B. S. N. H., 218, 1875. Texas.
9. *erastrioides* Guen., Noct. 2, 218. Canada ; Eastern and Middle States.
10. *candefacta* Hubn., Zutr. 587–8. Canada ; U. S. east of Rocky Mts.
11. * *debilis* Walk., C. B. M., 786. Texas. Var. praec. ?
12. † *arizonae* Hy. Edw., Proc. Cal. Acad. 1878. Arizona. Coll. Hy. Edw.
13. *elegantula* Harvey, Can. Ent , 8, 55 ; *Var. semiopaca* Grote, Bull. U. S. Geol. Surv. 4, 182. Montana ; Nevada.
14. *binocula* Grote, Can. Ent. 7, 224. Var. *virginalis* Grote. Texas.
15. *cretata* G. & R., Trans. Am. Ent. Soc. 3, 181, pl. 2, fig. 78. Texas.
16. *lactipennis* Harvey, Can. Ent. 7, 135 ; Bull. B. S. N. S. 3, 10, pl. 2, fig. 3. Texas.
17. *delecta* Walk., C. B. M., 799 ; *metallica* Grote, Proc. Ent. Soc. Phil. 4, 321, pl. 2, fig. 7. Southern States.
18. *terminimaculata* Grote, Bull. B. S. N. S. 1, 153. Eastern and Middle States.

Staudinger enumerates six species of *Taraehe (Acontia)* in the European fauna. As above cited we have eighteen. Of these, two, Nos. 12 and 13, were originally described under *Thalpochares ;* one of them I have not been able to examine critically *(Arizonae).* I have seen the type in Mr. Edwards' collection ; it is frail and small, in ornamentation recalling *elegantula,* of which I have been able only recently to see the type also in Mr. Edwards' collection. Both these species need neurational study to determine positively their generic location ; of *elegantula* I have only a single perfect individual, the type of *semiopaca,* and cannot sacrifice the specimen. Our fauna contains many handsome and noteworthy species. Foremost among these are *delecta,* which resembles the species of *Eudryas* in color and *cretata* and *lactipennis,* which recall *Ciris Wilsonii.*

* From recollection of the type Mr. Walker's *debilis* is a variety of *candefacta.*

† This and the following were described under *Thalpochares.*

Hyblaea puera Fabr.

From a specimen shown me by Mr. Neumoegen as Mr. Strecker's new genus *Aenigma*, with its "very large number of subcostal nervules," I infer that Mr. Strecker has re-described this Fabrician genus and species, which latter is variable and enjoys a wide geographical range. It is also very probable that Mr. Strecker's new "Cosmia" from Florida, described in Proc. A. N. S. Phil., is the typical southern ♀ form of the Bombycid, *Hyparpax aurora*.

Botis dapalis, n. s.

Fore wings with dusky gray median space; the rest of the wing brownish. An arcuate dark brown anterior line; posterior line similarly colored, sinuate, followed by a vivid white shade at costa. A brown dot in the place of the orbicular; a small black streak in the place of the reniform. Terminal space gray. A black dotted line followed by a gray line before the brownish fringes. Hind wings crimson red with a black extra discal mark, the fragment of an extra mesial line. Edge of the wing and internal margin black shaded. Fringes silky, long, brownish, tipped with reddish. Beneath fore wings red with the discal marks repeated and the exterior line, followed by the white costal shade, repeated. Hind wings yellow, shaded with red, with a red discal dot and extra mesial jagged line; a subterminal line marked at costa. Fringes brownish, long, silky, stained with red. Body parts dark brown, paler, reddish beneath; palpi reddish at the sides. *Expanse* 18 mil. California, Mr. Hy. Edwards, No. 3,023. A very distinct species belonging to the *subsequalis* group.

CORRESPONDENCE.

CONCERNING CHRYSOPHANUS NAIS, EDW.

DEAR SIR,—

This species was described from defective and scanty material, brought in from Arizona. As it has recently been taken in numbers in So. Colorado and New Mexico by Mr. B. Neumoegen and others, we are able to see that it belongs to the Erycinidæ, and its habits are reported to be like those of Lemonias Virgulti and allies. I enclosed a pair to Mr. A. G. Butler, British Museum, and he replies 22nd Nov.: "I do not wonder at your describing the little butterfly as a Chrysophanus; it was a most

natural mistake considering that the coloring and pattern are quite like that genus, and quite unlike the members of the genus to which it appears to belong. In structure it agrees best with Apodemia (I might say it agrees altogether), but the pattern of the under surface is not like any member of that genus known to me, being more like the arrangement found in Echenais. If color therefore can be called a structural character, the species belongs to no known genus, but as I do not consider this to be the case, I should certainly refer it to Apodemia."

Coalburgh, W. Va., Dec. 9, 1880. W. H. EDWARDS.

ON HYPHANTRIA TEXTOR.

DEAR SIR,—

Hyphantria textor (Harris) made its appearance in this locality on May 10th, and from that date to the 13th I captured 53 ♂ examples and 10 ♀.

On June 17th the second brood appeared, and in three days I took 41 ♂ and 10 ♀.

Unfortunately, at the time of the appearance of the third brood, it commenced raining, and for two weeks, almost every day or evening, we had heavy showers, nearly exterminating lepidoptera.

In the first brood every male had the black spots on the primaries, from a single spot on each wing to almost covered, and in some examples a spot on the secondaries. In the second brood all were white, not an example with the least trace of a mark, the females in both broods entirely white. I anxiously waited for the third brood, but for reasons above, did not see a single specimen. My object was this :—Has the first brood or that which remains over winter only, the black spots? or does *H. textor* alternate? Will some of your readers please answer the above questions through your valuable journal.

August 3rd, 1880. JAMES S. JOHNSON, Frankford, Penn'a.

DEAR SIR,—

In connection with Mr. Fletcher's interesting article on *Calosoma*, I send you my experience of *scrutator*. On 11th June I left Hamilton for Long Point. I had half a day to spend at Port Dover before the boat left. About noon a strong breeze sprung up from the S. W., which drove the waves up the shore. I took a stroll along the beach, and had not gone far when I saw a greenback just landed, making rapid strides with

his long legs away from the water, and I seized my first living *scrutator*. I took several of them that afternoon alive, some of them simply that and nothing more. At Long Point the evidence of what had been was unmistakable; the water lines of various storms of different forces were marked with bands of green wing-covers. I was too late for the harvest, very few coming ashore while I was there. When sugaring for moths we took from 2 to 5 every night, and one night 16. A large gauze-winged fly was attracted in great numbers to the sugar, and the *scrutator* was attracted by them, for in almost every instance we took them with one of these in their jaws. When seized they would drench the fingers with an acrid fluid of the most offensive odor; it was very volatile, drying rapidly with a sensation like alcohol. In one instance I took one from under a board on the beach, and in blowing off the sand that adhered to it some of the fluid struck my lip; it burned for an instant sharply. The odor from them leaves in a very short time. Does it not seem strange they should remain so scarce in the country when they are landed in such numbers on our shores alive? A friend, Mr. A. H. Kilman, of Ridgeway, writes me that they came ashore this spring after a south-west storm in hundreds, dead and alive. And we may suppose it to be about the same along the whole north shore of Lake Erie, and yet I know of but three taken in the neighborhood of Hamilton in 20 years. J. Alston Moffat.

Hamilton, Ont., July 9th, 1880.

ARBOREAL AUSCULTATION.

Dear Sir,—

Some time ago, while visiting the Dean and Williams Gold Mine, in the township of Marmora, I was interested in observing the proceedings of some woodpeckers which resorted to some half-dead pine trees in front of my room window. I remarked that after alighting they would run upwards in a zigzag way, stopping occasionally, and applying the side of their heads to the tree, evidently listening for the noise made by a grub while gnawing the wood. Suddenly a bird would begin to dig into the bark, the rapid strokes of its powerful bill making the chips fly faster than a lumberman's axe. On one occasion, by the aid of an opera-glass, I saw one fellow transfer something large and white from the cavity he had excavated to the interior of his craw, but the quickness of the action prevented me from ascertaining precisely what it was.

Thinking of this, it has occurred to me that the presence of a

"borer" in a fruit or other tree might be ascertained in the same manner by the use of a tube of wood or tin-plate formed like a stethoscope or ear-trumpet; by applying the wide end to the tree and the small end to the ear, the exact locality of the grub could be determined, when the application of a stout brad-awl or small gimlet would put an end at once to his life and his depredations without material injury to the tree.

JAMES T. BELL.

NOTE ON CHRYSOMELA JUNCTA, C. 10-LINEATA AND CARYOBORUS ARTHRITICUS.

DEAR SIR,—

During last Aug. and Sept. *Chrysomela juncta* has been more abundant than I have ever before seen it in this vicinity, and with larvæ was feeding on the leaves of *Solanum carolinense*, in company with *Chrysomela 10-lineata* and *larvæ*. The larva of *juncta* differs from *10-lineata* in being stouter and with the head larger. The color is dirty white. They are readily distinguishable apart. I took in the sexual act a male of *juncta* and female of *10-lineata*, and Mr. Siewers, of Newport, also observed the two species in intercourse. In the neighboring potato fields were thousands of *10-lineata*, but no *juncta*. Specimens killed in cyanide and pinned immediately after death all turned black in drying; to get a few good specimens I flexed the abdomen down, cut an incision along the top and removed the soft parts, put in a small quantity of arsenic and filled the cavity with cotton—getting as a result bright and beautiful specimens.

A friend in Fla. writes, saying: "I send a box of seed of the 'Cabbage' tree. I gathered them and put them away, and when I opened the box I found a bug in every seed. What are they?" The seeds, about 100, are of the *Sabal* palmetto; out of the entire lot only two or three did not contain a beetle, *Caryoborus arthriticus* Fab. The entire inside portion of the seed being eaten out and the insect filling the cavity, a round cap had been formed—by the larva, perhaps, cutting a ring through to the external skin of the seed on the inside, leaving it so that a push would burst it outward. The cap was in many cases burst off, and in all cases the insect was presented towards the opening tail foremost; all were dead. Is this one of the uses of the powerful posterior legs of this species, to burst the skin of the seed and thus get out?

CHAS. DURY, Avondale, Ham. Co., O.

A CORRECTION.

DEAR SIR,—

In my article which appeared on pages 21–23 of the CANADIAN ENTOMOLOGIST, Vol. xiii, No. 2, the species was erroneously accredited to *Plusia precationis* Gueneé, instead of to *Plusia simplex* of the same author. This mistake on my part was owing to the fact that the moths from which I obtained the eggs had the metallic spots in the centre of the fore wings nearly as they are in a *precationis* which Mr. Grote determined for me. I have been enabled the present season to correct my former mistake by the use of the excellent descriptions of the Plusia moths given by Prof. Cyrus Thomas in his Fourth Report.

On the 21st of November, 1881, I received from the Editor of the Germantown *Telegraph* a box of insects for determination, and in the letter which accompanied the box the Editor stated that the worms which he sent me were very destructive to the celery in many gardens in his locality.

These celery worms agreed precisely with the description of the *simplex* larvæ referred to above. They differ from the larvæ of *brassica*, as given by Prof. Riley, only in having the spiracles ringed with black; and both of these larvæ differ from that of *precationis* by not having a black stripe on each side of the head. In all other respects these three larvæ appear to be utterly indistinguishable.

D. W. COQUILLETT, Woodstock, Ill.

The Canadian Entomologist.

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ON THE EARLY STAGES OF PLUSIA PRECATIONIS, GUENEE.

BY D. W. COQUILLETT, WOODSTOCK, ILL.

EGG.—Flattened-globular or button-shaped, sometimes with an impressed spot in the centre of the upper side; upper part grooved, grooves narrow, interspaces roughened; milky white; transverse diameter about ½ m. m.

LARVA.—*First stage:* Body deep green, two dorsal, a subdorsal and stigmatal white line, the latter the most distinct; piliferous spots green, usually tipped with black, each bearing a short black hair; venter deep green, unmarked; head pale green. Provided with only 12 legs.

Second stage: Same as first, and with an indistinct whitish line on the dorsal space; subdorsal space usually tinged with black.

Third and last stage: Same as second; body robust, tapering anteriorly; length at maturity 1¼ inches.

CHRYSALIS.—Of the usual shape, blackish brown, terminates behind in a short, thick, cylindrical projection, rounded behind and tipped with one or two small hooks; antennæ and leg cases project beyond the wing cases in the form of a small bulb; length from 13 to 15 m. m.

In the larvæ of this brood I observed only two moults, and if there is a greater number of moults than this they probably occur prior to the first moult mentioned above. Just before moulting the larvæ left their food and collected on the ceiling of their cage.

In some of the captured larvæ which I have reared the piliferous spots were sometimes entirely black, or had a black basal annulation; sometimes the head was surrounded with black, or had a black streak on each side; in many of them all of the white lines, except the stigmatal, were obsolete.

On the 17th of May, 1880, I enclosed a female *precationis* in one of my breeding-boxes in which some grass, clover and plantain were growing. In the afternoon of the next day she laid about 50 eggs, placing them singly, or in small rows or patches, on both the upper and under sides of

the grass and plantain leaves, seldom placing more than five eggs in one cluster. Shortly after hatching the larvæ ate the parenchyma of the blades of grass, leaving the veins untouched; after increasing somewhat in size they fed upon the plantain leaves. The first larva of this brood began spinning its cocoon on the evening of June 16; it became a chrysalis June 19, disclosing the imago June 28. The chrysalis could easily be seen through the thin cocoon. When this larva began spinning its cocoon the other larvæ of the same brood, hatched out at about the same time and reared under precisely similar conditions, were of all sizes from those only one-half grown to those nearly full grown. As they appeared to be costive, I supposed that it was caused by a lack of water; accordingly I wet a few leaves and fed them to the larvæ, shortly after which they were taken with a violent scouring, which so reduced them that all but one died; this one spun its cocoon and went on to chrysalis, but died before producing the imago.

On the 6th of July following I obtained another laying of eggs, and the larvæ from these showed the same variation in size as those of the first brood. When some of them became nearly full grown they were attacked with a disease which caused them in a short time to turn black; if handled after death the skin readily broke, showing the interior to be filled with a blackish liquid. As soon as this disease made its appearance I removed the healthy larvæ to new breeding-cages, but they all finally died of this disease.

On the 23rd of April, 1879, I obtained a larva of this species which spun its cocoon the next day, disclosing the imago May 20; the earliness of the date precludes the possibility of its having issued from the egg the same season. It was taken while feeding upon dandelion leaves; I have taken other larvæ of this species upon the leaves of burdock and plantain. Prof. G. H. French states* that they also feed upon the leaves of the thistle and hollyhock, but I have never taken them upon either of these plants. I have seen caterpillars which did not differ materially from those of *precationis* feeding upon cabbage leaves, and the *precationis* larvæ in my breeding-cages fed readily upon these leaves. As there is so much difference in coming to maturity among the larvæ of the same brood, it is evident that no given number of broods are reared in one season by all of the members of this species; four broods in a season seem to be the maximum number, while the average number is probably three.

* Seventh Report St. Ent. Ill., p. 229.

In the afternoon of June 29, 1880, I saw a female *precationis* depositing her eggs; these she placed singly on the leaves of grass and low weeds, seeming to have no preference for any particular species of plant. This diurnal habit of the moth seems to be a well established one, for I have frequently seen them taking food from clover blossoms in the day time, and the moth from which I obtained the first laying of eggs was captured while hovering around lilac blossoms at mid-day when the sun was shining brightly. In vol. xi., page 108, of the CANADIAN ENTOMOLOGIST, Mr. W. L. Devereaux also records the capture of a *precationis* on the 1st of June "at lilac blossoms in the day time."

Precationis is very abundant in this locality, frequenting clover meadows in company with *Drasteria erechtea* and *Hypena scabra*. When flushed it flies a short distance with a graceful, undulating motion, and then alights in plain view without any attempt at concealing itself; after alighting it sometimes elevates its wings and vibrates them very rapidly.

Below is given in a tabular form the time occupied by this species in its different stages:

From deposition of egg to hatching	4 to	6 days.
" hatching to first moult		14 "
" first to second moult		3 "
" second moult to spinning cocoon		5 "
" spinning cocoon to chrysalis		3 "
" chrysalis to imago	9 to	23 "

NOTES ON SOME NOCTUID LARVÆ.

BY. G. H. FRENCH, CARBONDALE, ILL.

Mamestra trifolii, Esp.

Length when full grown 1.10 inches. In shape and appearance very much like the larvæ of *Agrotis lubricans*. Color uniform grass green marked as follows: a rather broad substigmatal line of creamy white, having at times a slightly pinkish tinge; a dorsal line of dark green. There is no trace of a subdorsal line except that the place of that line is a very little lighter on the first three joints when the larva is crawling. Stigmata narrowly edged with black. Head rather small, a little paler than the body. Piliferous spots very small.

Two of these were found in my garden hid among some weeds, June 29, 1880. After putting them in the rearing box one died, the other changed to a chrysalis July 5th, and produced the imago July 18th.

Prodenia lineatella Harvey.

Length 1.35 inches. Shape of body cylindrical, very much like the larvæ of *Agrotis*. Dorsal, subdorsal and substigmatal lines, and a line in the middle of subdorsal space, pinkish lilac. In the dorsal space there are, first a series of oval dark brownish drab spots, the broadest part occupying the centre of each joint, the several spots connecting with each other at the union of the joints. In width they extend two thirds of the distance from the dorsal to the subdorsal lines. On the subdorsal rests a series of either triangular or somewhat oval velvety black spots, one to each joint on each side of the body. These spots extend inward half way to the dorsal line, thus encroaching somewhat upon the drab spots. At the base of each black spot, next the subdorsal line, is a narrow, bright yellow, semi-elliptical spot. The rest of the dorsal space is gray irregularly striped with fine white. The upper half of subdorsal space is pinkish gray irregularly striped with fine black; the lower half black, similarly striped with fine light lines. Substigmatal space and venter carneous gray, the first spotted with white. The head and cervical shield are black, the inverted Y white.

The single larva from which the above description was taken was found in my garden August 20th, 1880, in a bed of salsify. While in confinement it ate readily of the leaves of salsify, peach and raspberry. August 25th it disappeared for pupation, and the imago emerged September 11th.

Leucania pseudargyria Guen.

Length one inch. General color fleshy brown, sprinkled over with dark brown. Dorsal line narrow, of general ground color; this and the subdorsal and substigmatal distinguished by not being sprinkled with brown. The dorsal space dark brown, composed of dark brown dots finely sprinkled over the surface. About midway this is partially separated as though forming two dark lines. There is a slight massing of these brown dots from the posterior part of the joint, near the dorsal line, outward forming an indistinct V. Subdorsal space much like the dorsal only lighter. Substigmatal space with few dots, a brown patch at the

base of each pro-leg. Head of the same general color as the body, mottled with brown. Cervical shield dark brown, small. Piliferous spots small, brown.

Two of these were found, one of which died from the effects of parasites. The other, found March 8th, changed to a chrysalis March 21st, on the top of the dirt in its box, under some dry grass, without a cocoon. The moth emerged April 18th. They were taken in situations indicating that grass constituted their food, and ate only that while in confinement.

Mr. Caulfield has given us a description of this larva in Vol. 6, page 132 of the Can. Ent., but as my specimens varied some from his, I thought it well to give what I have above.

ON THE EARLY STAGES OF GRACILARIA STIGMATELLA, Fabr.

BY V. T. CHAMBERS, COVINGTON, KY.

As elsewhere stated, the species formerly described by me as *Gracilaria purpuriella* is *G. stigmatella* Fabr. In the Natural History of the Tineina, vol. viii., p. 35, Mr. Stainton gives the following account of it: "The larva feeds in and upon willows, sallows and poplars. On the white poplar I have had an opportunity of observing the mine of the young larva, which is a *small blotch not very unlike the mine of a Lithocolletis larva.* (Italics my own.) As soon as it quits this mine, which it does at an early period of life, it rolls up a piece of the tip or edge of the leaf in a conical form, and it feeds on the interior of this cone, eating half through the substance of the leaf; as one of the cones does not afford sufficient sustenance for the larva during its whole existence, it treats in succession several leaves in this fashion, and the deserted cones always contain a considerable amount of excrement. On the white poplar the conical form of the habitation is not so marked, and sometimes it rolls over a piece of the edge of the leaf. When the larva is quite full fed it turns down a corner of a leaf, or else fixes itself straight over the midrib, and there spins its tough but glossy-looking cocoon, from which in a *few weeks* (italics mine) the perfect insect emerges." This is the most complete account of the larva of this species that I have seen; and I quote

it that the reader may compare it with my own observations as hereinafter detailed. The only point in which my observations differ essentially from those of Mr. Stainton, is that I find the duration of the pupa state as hereinafter shown to be only one week, instead of "a few weeks," but this may perhaps be accounted for by difference of season or temperature.

Partial life histories of many species of Tineids have been heretofore published, but very few full or detailed ones; and the only attempt at a complete history of any species of *Gracilaria* that I have met, is Mr. Healy's account of the larva of *G. syringella*, in the Entomologist's Monthly Magazine, v. iv., p. 150, *et seq.*, and unfortunately I have seen only the last two parts of it; and therefore I do not know what account he gives of the structure of the mouth parts, nor of the ecdysis in the earlier stages of the species. Mr. Healy states that *syringella* frequently goes under the ground to pupate, and in this respect it appears to be singular in this genus, but probably it only does this in confinement. His account of its manner of rolling and fastening the leaf and of making its cocoon is characteristic, I think, of the larger species of this genus—the true *Gracilariæ*. I infer from Mr. Healy's concluding remarks (*loc. cit.* pp. 176 and 197) that *syringella* passes through only four larval stages. Thus he states that when the larva first leaves the mine "it crawls to the under side of another leaf, the tip of which it rolls downward;" that "after a few days residence in the rolled leaf the larva moults for the second time." My observations on *stigmatella* and other species of the genus lead me to the conclusion that there are two moults in the mine, and that the moult which Mr. Healy calls the second is really the third; and that the first stage, and first moult of *syringella* (in which it has trophi of what I have elsewhere denominated the "first form," and membranous thoracic feet) escaped his observation. Mr. Healy only mentions two other moults later than that which he calls the second, making according to his account only four larval stages. But the species whose larval history I have observed (*stigmatella*, *rhoifoliella*, *robiniella* and *salicifoliella*) all have five larval stages: and in the first stage all have the trophi and feet as above stated, so that I think it probable that the first moult, which takes place when the larva is not more than 85 m. m. long, escaped Mr. Healy's observation. But as above stated, I have not seen the first part of his paper.

Mr. Stainton mentions a slight difference between the habits of *stigmatella* when found on "white poplar" and when found on willows; that is, the

cone was more regular on the latter. I have observed the same difference between those found on willows and those found on silver-leaf poplars and cottonwoods. I attribute it to the size and stiffness of the poplar leaves. I have never met with the larva on the weeping willow. But to return to its life history.

On the morning of Saturday, July 10, I found on a leaf of cottonwood *(Populus monilifera)* a narrow white line about one-half inch long, which was at once recognized as that of this species in a very early stage. On holding the leaf up in the sunlight the larva was visible in the mine ; it was flat, had membraneous, unarticulated and unarmed thoracic legs and mouth parts of the "first form," with the head and thoracic segments a little wider than the abdominal segments, and looked very much like a *Lithocolletis* larva of the flat group in the same stage. (Nevertheless a practiced eye will distinguish a *Lithocolletis* from a *Gracilaria* larva even in this stage.) It was less than 8 m. m. long, and as I infer from many observations on these small larvæ and their mines, it was but a few hours, probably about twelve hours from the egg. It extended the mine until it was about 1.9 m. m. in length, and scarcely wider than the body of the larva, and the mine looked like a portion of a *Phyllocnistis* mine ; then it made a few digitate lateral branches, and the mine resembled a young mine of *Gracilaria robiniella* in locust leaves ; then it connected these branches so that the mine became an irregular parallelogram about 1.9 m. m. long and 6 m. m wide ; and now, as stated by Mr. Stainton, the mine was not unlike a young *Lithocolletis* mine, or a white blister on the leaf. Like all larvæ with trophi of the first form, it ate only a layer of cells beneath the cuticle, not burrowing down into the pareuchyma. On Tuesday evening, July 13th, about three to three and one-half days after it left the egg, I found that it had very recently moulted whilst still in the mine and that the body was now nearly cylindrical, that it had trophi of the second form, and articulated thoracic legs each armed with a claw. On Friday evening, July 16th (the larva now being about seven days, within a very few hours, more or less, old) it was still in the mine, but not feeding, and I *think* it had just moulted (2nd moult) ; but at an early hour the next morning it had left the mine and was found on the leaf near to the mine, and not feeding. I think it had very recently quitted the mine. Three hours afterwards I found that it had gone to the tip of the leaf which it had rolled up and was feeding in the roll ; and on opening the mine two exuviæ were found in it, one of which had the head and

trophi of the first form, and the other and larger one of the second form. It had therefore been in its mine within a few hours, more or less, of seven days, and had undergone two moults there. On the next Friday, July 23rd, I found that the larva was not feeding, so I unrolled its cone and found in it two more casts, one of which was still fresh. Here were therefore two moults *within* the week, making four in two weeks from the egg, and the larva was a little more than half grown It eats much more and grows much more rapidly in its last stage. When taken from its roll, as just stated, it was placed upon a fresh leaf, where in a little while it had curled up the edge of the leaf, fastening it all around by a web instead of by the little cords as in its first roll. On Monday morning early, July 26th, it was still in its roll, but three hours later it had left the roll and begun its cocoon at the edge of the leaf. This is unusual, as the mine when the larva is free is placed over the midrib. The contraction of the silk curled the edge of the leaf over the cocoon. The pupa was disclosed early in the morning of the 28th July, about two days after the cocoon was begun, but less than a day after the cocoon was finished; the four previous moults each occupied about twelve hours, as I was able to determine approximately by observing whether or not the larva was feeding. There are thus five larval stages. The entire larval life before beginning its cocoon is about seventeen days, within a few hours more or less, giving nineteen days as the entire larval life. This is about the length of larval life in *Lithocolletis* and *Leucanthiza*. That of *Phyllocnistis* is not known; that of some species of *Nepticula* (a genus very far removed from the others above named) is sixteen days in some species, only a week in some others, and probably even less in some others. In the larva whose history I have given above the imago was disclosed Aug. 4th, so that the pupa state lasted just a week, or just twice as long as any single larval state. The same rule holds in *Lithocolletis* and *Leucanthiza*. In *Phyllocnistis* we do not know the length of the larval stages, but the pupa state lasts eight days. I refer only to the summer broods, of course. In some species of other genera, as *Nepticula ptelicella*, not yet described, the first and second larval stages each last three days, whilst the third (and last one) lasts just twice as long—six days, and has just double the rate of growth, so that it looks as if a regular moult had been skipped. Is the pupa state likewise the equivalent of two larval stages?

ON A LATELY DESCRIBED SPECIES OF LIMENITIS.

BY H. STRECKER, READING, PENN.

Mr. W. H. Edwards' *Limenitis Eros* published in the Dec. (1880) No. of Can. Ent., p. 246–251, is the same insect described by myself two years since in the Synonymical Catalogue, p. 143, as follows: *Limenitis Misippus* "var. a. FLORIDENSIS, nob.—The form found in Florida and other parts of the extreme south. Whilst our more northern form is of the same color as *Danais Plexippus*, this southern variety exactly mimics in its dark coloration *Danais Berenice*, with which it associates." From this I think it will be seen that Mr. Edwards was in error in his supposition that *Floridensis* was different from *Eros* and indicated a species with dark upper surface and pale under side of secondaries, as neither in the place above cited nor anywhere else have I made any such statement or said anything that would lead to such a supposition. My types were sent to me from Apalachicola, Florida, by Dr. A. W. Chapman, a number of years since, and they are as dark below as above, or at least the difference in shade is so little, if any, that it takes the closest examination to detect it; had there been any perceptible difference between the color of the upper and lower surfaces, or between the primaries and secondaries on either surface, I should have mentioned it in my description, which, though brief, I think was sufficiently to the point in regard to color when I said "this southern form mimics in its dark coloration *Danais Berenice*," which latter, as is well known, is of the same color on both upper and under surfaces. I believe now as I did at the time I described this form, that it is only a southern variety of *Misippus* found in southern Alabama, Mississippi and Florida (I once received it from New Orleans, La.) Even the differences in the processes in the three cuts accompanying Mr. Edwards' paper are not greater between (fig. a) the one representing *Floridensis* (his *Eros*) and any one of the other two representing the type form of *Misippus (Disippus)* than between the two latter (figs. b. c.) And as regards any difference in the larvæ, I do not see why a variety or aberrant form is not as likely to differ from the type in the earlier stages as it is in the imago.

The form that Mr. Edwards mistook for *Floridensis*, of which he writes as being "almost as dark as *Eros* on upper side" and in which "the under side of secondaries is but little darker than in many northern examples," is entirely unknown to me; out of hundreds of *Misippus*

(Disippus) which I have seen I never detected one that answered to such a description; all that I have seen belong either to the common pale tawny typical *Misippus* or the southern dusky var. *Floridensis (Eros* Edw.); excepting the two monstrosities *nigra* and *Pseudodorippus*, which are neither species nor permanent varieties, but mere freaks of nature.

Reading, Jan'y 13, 1881.

ON A NEW SPECIES OF PACKARDIA.

BY L. W. GOODELL, AMHERST, MASS.

For several years I have had in my collection, among other undetermined specimens of Bombycidæ, a species of *Packardia* which did not seem to agree with any of the published descriptions that were accessible to me. Mr. Grote, to whom I lately submitted the specimen, kindly informs me that it is as yet undescribed.

PACKARDIA NIGRIPUNCTATA, n. sp.

1 ♀. Fore wings light bronzy brown; a narrow, oblique, nearly straight, dark brown band runs from near the inner margin outward to a little beyond the middle of the costa, where it is joined at a right angle by another band which is short and curved, terminating at about one-third of the distance from the costa to the inner angle. Between the end of the short band and a little outward and above the internal angle, is a curved row of three roundish black dots, of which the marginal one is three times larger than the inner and twice as large as the intermediate one. The bands and spots form a distinct inverted V. Within the area thus formed and parallel with the inner band is a brown line which extends from the inner margin to the discal end of the short curved band. This line is a shade lighter in color than the bands and is edged outwardly with very pale or whitish brown. There is a band of the same pale brown or whitish color which includes the black dots and extends outside of the short curved band to the costa. It is constricted near the inner dot, widening rapidly towards the costa, along which it extends towards the base to a little beyond the middle. Hind wings paler, the apex and outer margin concolorous with the fore wings. Fringe of all the wings pale silky brown interlined near the base with darker brown and with a black

spot on the apex of the primaries. Fore wings beneath uniformly a little darker than above. Hind wings beneath much as above, but the darker shade of the exterior margin and apex is not so distinct. The wings above and beneath have the peculiar silken lustre common to the genus. Head, thorax and abdomen ochreous brown. Legs grayish brown, the tarsi a little paler. Length of body 7 mil. Expanse of wings 20 mil.

The wings are not so broad as in *geminata* and *albipunctata*.

Obtained from a larva found on oak in Amherst. I very much regret that I neglected to take a detailed description, but as near as I can recollect the larva was oval or boat-shaped in form. green with several longitudinal rows of minute white papillæ or spots. The cocoon was round and hard and the moth emerged June 20.

ADDITIONAL NOTES ON THE GENUS ANTIGASTER OF WALSH.

BY L. O. HOWARD, WASHINGTON.

In the light of Professor Riley's recent criticism (American Entomologist, December, 1880,) upon my conclusion that *Antigaster* Walsh is synonymous with *Eupelmus* Dalm., I have gone over the ground again with his objections before me, and still adhere to my original view. The objections may be summed up as follows :

1st. *Antigaster* has 10-jointed antennæ ; *Eupelmus* (according to Westwood) has 13.

2nd. The club is obliquely truncate from beneath with *Antigaster*, while (according to Westwood) it is ovate with *Eupelmus*.

3rd. The first tarsal joint of the middle tibiæ is "widened and dentate" with *Antigaster*, and simply "furnished with bristles" (according to Walker) with *Eupelmus*.

4th. The abdomen is widened behind with *Antigaster* (? with *Eupelmus*).

It is a very easy matter to show, in regard to the first objection, that the discrepancy in the number of antennal joints arises simply from the

method of computation. Counting the club as one joint and omitting the "annular" joint between 2 and 3, the antenna of *Eupelmus* would count as 10-jointed (see figure of antenna of *E. Geeri* Dalm., Walker's Notes, p. 76, and also antenna of *E. cereanus* Rondani, Bull. Soc. Ital. Ent., 1877, ii., pl. iv., fig. 122). Applying the ordinary method of computation to the antenna of *Antigaster*, it will be seen to be 13-jointed. The identity of the two is readily seen from the accompanying figure, *b* representing a camera lucida sketch of the ♀ antenna of *Antigaster*, and *a* a reproduction of Walker's figure of *Eupelmus Geeri*.

Fig. 3.

With regard to the second objection, an oblique truncation of the club is seen in Rondani's figures of *E. cecidomyinus* and *E. circinantis* (ibid, figs. 147 and 150), and also slightly in Walker's figure reproduced above; so Westwood's definition, "club ovate," does not hold with acknowledged European species.

3rd. The character quoted from Walker (translated by him from Foerster) is incomplete as applying to *Eupelmus*, as Thomson (Hym. Scand. iv., 103) says, "tarsis ♀ semper dilatatis." That the "bristles" of Walker (Foerster) are identical with the "dentations" seen with *Antigaster*, seems most probable from the fact that Foerster, in his figure of *E. Geeri* (Beitr. z. Monog. d. Pteromal., pl., fig. 3) shows projections on the middle tarsi altogether too stout for "bristles"; and also from the fact that the term "rigid pectinations" of Rondani would apply very well to the dentations of *Antigaster*. These are really but a higher development of the strangely modified bristles seen upon the middle tarsi of some Encyrtinæ, notably of *Comys*.

4th. A glance through a number of descriptions of European species of *Eupelmus* shows that the shape of the abdomen varies from the "abdomen lanceolate" of *E. subvittatus* (Walker's Notes, p. 83) to the "abdomen *increasing in breadth from base to tip* of *E. pezomachoides* (ibid, p. 82). So the fourth objection will not hold.

Walker's recognition of *Antigaster* in 1869 certainly amounted to but little, since he entirely omitted it from his generic synopsis in 1872.

I would state in conclusion, as a confirmatory evidence of my view, that, since the American Entomologist article appeared, in looking over a list of Chalcids identified for me by Dr. Mayr, of Vienna, I find that

specimens of *A. mirabilis*, sent him without name, are entered upon the list as *Eupelmus* sp.

Taking all these facts into consideration, it seems to me quite plain that *Antigaster* should be dropped.

NORTH AMERICAN MOTHS.

BY A. R. GROTE.

(Continued from Page 17.)

Botis lethalis, n. s.

Allied to *atropurpuralis*. Fore wings purply brown to the exterior line, which is distinct, nearly straight, a little bent submedially, dark brown followed by a whitish coincident shade line. Subterminal space pale brown, shaded with whitish. A terminal whitish shade before the broken terminal line. Fringes dull pale brown, interlined. Hind wings pale fuscous, with an extra mesial line apparent inferiorly, bent before anal angle, followed by a pale shade. A fine black terminal line; fringes pale, interlined. Beneath the ornamentation of primaries repeated. Hind wings pale, with a narrow mesial line bent before anal angle. *Expanse* 16 mil. Hab. California.

Botis vacunalis, n. s.

Allied to *dasconalis*. Fore wings and thorax pale yellowish white without markings. Hind wings pure white, immaculate, with a dotted exterior black line, only partially continued; a terminal row of dots at the base of the white fringes. Beneath the primaries are whitish, with the veins marked with fuscous and a transverse extra discal fuscous line. Abdomen white. *Expanse* 24 mil. *Hab.* Sierra Nev., Calif., Mr. Hy. Edwards, No. 3,001.

Botis turmalis, n. s.

♂. This species has a casual resemblance to *Nomophila noctuella*. Pale dusty ochrey. The costa of primaries broadly washed with blackish brown, absorbing the rather large dark discal spots. An exterior dotted line. A terminal series of blackish dots. Hind wings with a terminal

dotted line before the fringes and an extra mesial dotted line more apparent beneath. A discal dot. Beneath the veins are slightly marked with fuscous and the markings of the upper surface are repeated. Fore wings long, apices pointed, exterior margin oblique. *Expanse* 27 mil. Colorado Rio, Prof. Glover, Aug. 24.

Botis rufifimbrialis, n. s.

Allied to *sumptuosalis*, but the fringes are reddish fuscous cut with deep red. Fore wings purply red over blackish ; the costal region and terminal space being very dark. The two discal spots are small and black and difficult to make out ; there is a yellow dot between them. Two dark yellow bands cross the wing ; the inner oblique, not continued on costal region, not very distinct ; median space inferiorly with scattered yellow scales. The outer yellow band is broken into a rather large spot opposite the disc and appears again as a short waved line above internal margin. Hind wings blackish, sub-transparent, with red stained fringes and an abbreviate yellowish line. Abdomen fuscous above, pale beneath ; legs, pectus and under side of palpi pale or whitish ; palpi and thorax above dusky. Wings beneath paler than above, especially the secondaries at base, within a darker marginal shade. *Expanse* 16 mil. Mass., Mr. L. W. Goodell.

Botis flavinotalis, n. s.

Allied to *octomaculalis*. Wings black, the fore wings sprinkled with sulphur yellow scales, forming streaks at the base. Fore wings with two sulphur spots, one irregularly rounded over the median nervules, the other at the end of the cell narrowing to costa. Hind wings with two mesial sulphur spots, the lower elongate. Fringes pale. Abdomen finely ringed with yellow. Beneath the spots are whiter ; on the secondaries the mesial spots are surmounted by one on costa. At base on both wings the pale yellow color appears as blotches or streaks. Breast and head with powdery yellowish scales. Thorax black with fine yellow lines bordering the tegulæ. *Expanse* 20 mil. Pennsylvania, Mr. Hy. Edwards. The species has a false appearance of a *Melicleptria*.

Botis annaphilalis, n. s.

Fore wings dark gray with a large brown suffused spot below the black reniform. Ordinary lines obsolete ; fragments of the subterminal line appearing at internal margin and below costa as black marks. Inner line

faintly visible. Hind wings faded reddish orange with fuscous fringes, with a black line slightly waved at their base. Fringes of fore wings blackish with pale dots. Beneath both wings orange, fringes fuscous ; on primaries a discal streak and a spot above on costa. Body dusky gray ; abdominal hairs somewhat orange ; beneath paler, somewhat whitish. *Expanse* 27 mil. Havilah, Cal., Mr. Hy. Edwards. This species has the false appearance of an *Annaphila*. It is easily recognized, and seems allied to *fodinalis* Led.; it is as large but very different in colors and ornamentation.

Crambus undatus, n. s.

Allied to *exsiccatus*, but smaller, with the lines without the submedian indentation. Pale whitish gray over light brown, a whitish shade from base along the centre, the wing with scattered fuscous scales. The two fuscous brown lines are very distinct, sub-parallel, near together, well removed outwardly, jagged, angulated below costa, the inner line a little more inwardly oblique and irregular below the cell than the outer. A fine dark line at the base of fringes, which latter are interlined and metallic at the tips. Hind wings pale with a subterminal line feebly marked on both surfaces. Fore wings fuscous beneath with the lines indicated. *Expanse* 21 mil. California, Mr. Hy. Edwards, No. 4454.

Catocala grynea var.

Mr. A. Conradi has collected near Bethlehem, Pa., a singular aberration of this species in which the black bands on the under surface are very broad and the secondaries above almost entirely black, except a yellow spot at base and two more beyond the middle of the wing.

NOTES UPON CLIMATIC INFLUENCES ON SAMIA GLOVERI OF UTAH AND S. CEANOTHI OF CALIFORNIA.

BY A. H. MUNDT, FAIRBURY, ILL.

The summer of 1879 was quite warm and dry in Utah as well as California. This was very disastrous to the larvæ of *S. Gloveri*, which, it is well known, feed on the willows in Utah growing in or near swamps or near creeks in canons.

That year more than half of the cocoons received during the winter were dead ; many of the larvae had but half changed, *i. e.*, half was stlll larva, the other half (generally the lower) had already changed to pupa, and in most cases, with the larval skin still clinging about it, in a few partly split open at the back, thus exhibiting the pupa in part. Some, in fact, thus received were alive in that curious condition until spring ; very few of the living pupae were of the proper size. The collectors had also much trouble in gathering them.

However, while *Gloveri* under such conditions did not thrive well in Utah, *ceanothi* in California made splendid cocoons, and but very few, comparatively, did not produce fine imagoes, while most of the *Gloveri* that did hatch were crippled.

This season, 1880, the weather seemed quite the reverse of 1879 ; the atmosphere was more damp, and cocoons received during this winter from Utah are very much larger, heavier and healthier in appearance than in the former ; in several large lots received but very few were not good, and the collectors in the winter of this season had less trouble in obtaining them and were only prevented from gathering large quantities by the deep snows occurring in Utah this winter.

The change with *ceanothi* was this season again the reverse, as my correspondents write me frosts occurred nearly every morning in those portions of California quite late in the summer, the result being that *ceanothi* was very late and also scarce, and the cocoons very much smaller compared with the previous season, and many of these were no good. Larvae received from Mr. Baron, arrived Sept. 10th, were not half as large as those I had raised here in a moderately tempered but well ventilated brick building.

Certain it is, however, that localities may be found in seasons of general scarcity, in valleys or protected by surrounding hills or woods, where certain species may be found in great abundance and in fine condition.

With many experiments I have tried for three seasons, I am convinced that cocoons of *Gloveri* should be kept in a cool place in winter (freezing will not hurt them), or they will hatch cripples, if alive at all ; while *ceanothi* should be kept in a place neither too warm nor dry, but not too cold, until the spring season is well upon us.

That *Gloveri*, *ceanothi*, *columbia* and others of that family are originally of one form, whether *cecropia* or some other species, I have no doubt ; of course climatic and food changes, for many generations, as is well known

in other departments of zoology as well as botany, have brought about great changes. I have had no trouble in crossing ♂ and ♀ *Gloveri* with *ceanothi*, *cecropia* and *ceanothi*, and *Gloveri* and *cecropia*, and have now in my possession some fine cocoons of such hybrids between *ceanothi* and *cecropia*, of which I will speak after the imago appears.

ENTOMOLOGICAL NOTES.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

1. *Cecidomyia spec.* on *Aristolochia sipho.*

Flat rounded galls on the under side of the leaves, pale, somewhat transparent, pale greenish, 4 mil. diam. On the upper side of the leaf the gall becomes a slightly elevated disk marked with dark red and having in the middle a small pale-bordered hole. The galls grow larger and more globular on the stems of the leaves, to globes of 8 mil. diam., some more elongated, 18 mil. long and 8 mil. broad. The larvæ are brick red, 3 mil. long, very agile. I find no species on *Aristolochia* described by Osten Sacken and others.

2. Caterpillar of *Papilio philenor* on *Aristolochia sipho.*

I received a number nearly full grown, and young ones (about 10 mil. long). Harris, Ent. Corresp., p. 147, discovered them on the same plant in the botanical garden in Cambridge, August, 1840, and Mr. Scudder, List of N. Engl. Butterflies, p. 162, says "once or twice taken in Eastern Mass. last September." I don't know if the species is taken more often, but it is remarkable that the caterpillars (about two dozen) were nearly full grown on June 16th, as Harris and Scudder give August and September.

3. *Nematus Erichsoni* on *Larix Europaca.*

A large number of larvæ very young to nearly full grown, some probably full grown, were sent living with the twigs. The larvae agree perfectly with description and figure in Ratzeburg's Forst-Insecten, Tom. iii., pl. 3, f. 4. The species is not represented in the collection here, neither in the larva nor in the imago state. It is not mentioned in Mr. Norton's Catalogue of N. Am. Tenthridinidae. I have to remark that the larvae of the three other species living in Europe on *Larix*, viz., *Lyda laricis*, *Nematus solea* and *compressa*, from their description, do not agree with those sent to me. I am indebted to the Harvard Arboretum and its Director, Mr. Chas. S. Sargent, for these specimens.

THE LARVA OF CATOCALA UNIJUGA.

BY D. S. KELLICOTT, BUFFALO, N. Y.

I obtained, June 16, 1880, from the trunk of a *Populus candicans*, at Buffalo, N. Y., two larvæ which proved to be those of *C. unijuga*. They had passed their last moult when taken; although they continued to feed in confinement for five or six days they increased in size but little during that time; their habits are strictly nocturnal. When first observed they were clinging to the bark beneath a limb, lying obliquely, and so flattened and leech-like that, together with their gray color and lateral fringes blending with the bark, they were difficult objects to discover; but for the fact that the first one seen occurred on a plane with the eye they would have been overlooked entirely. When disturbed they jerk themselves from side to side and move off rapidly with the gait of a semi-looper, although possessing sixteen legs.

The larger one measured 2.2 inches, the smaller 2 inches. The body is attenuated at extremities, especially anteriorly. The general color is gray above, below pink with a sub-elliptical black spot to each segment, those on the thoracic rings not conspicuous. The head flattened, slightly bilobed, lighter in hue than the body and bordered by a well defined black line. The lighter head lobes under a hand lens appear mottled and reticulated with black lines and blotches. The dorsal line is white, made up of patches, illy defined circles and spots alternating; on each ring on either side of the line there are two white papillæ from each of which arises a white hair; above the stigmata there is a white interrupted line, below them a black line also interrupted. The stigmata are rather large, elliptical, whitish surrounded with a black border. There is a row of stout hoary filaments just above the line of the legs. No protuberances appear on the dorsal aspect of any of the rings.

June 22nd the larvæ ceased to feed. On the following day they had fastened together some leaves by means of a silken gauze, brownish in color; by the 26th both had transformed. The larger pupa measured 1.2 in. At first the thorax and abdomen are red, wing covers dusky; after a few hours the whole surface becomes densely pruinose. Under the microscope the surface appears rough like Russia leather. The stout thorax is quite convex above, head smooth, abdomen attenuated, its tip black, bearing eight hooked hairs, the four upper, smaller, turn towards the median line, the four under, larger, turn away from it; by hooking

into the cocoon they retain the pupa more securely. The pupa and the larva also in cocoon before its change, when disturbed, throw themselves from side to side so rapidly as to give a sound like a shaken seed pod.

July 15th, one pupa disclosed a male *unijuga*, rather under size ; the second, smaller one, failed to give an imago.

Notes.—July 11th, when taking dinner at a farm house, I saw a large female of this species fly in at the open door ; it flew about the room until captured. There was a specimen of *P. candicans* growing hard by.

BIBLIOGRAPHY OF ECONOMIC ENTOMOLOGY.

We desire to call the attention of our readers to the following circular lately issued from the Department of the Interior :

DEPARTMENT OF THE INTERIOR.
Office of the U. S. Entomological Commission,
Providence, R. I., Jan'y 1st, 1881.

DEAR SIR,—

The U. S. Entomological Commission designs preparing for publication a bibliography of American (and Canadian) economic entomology. The bibliography will contain references to papers, articles and notes in agricultural and popular scientific periodicals, as well as journals devoted to bee culture, and as complete as possible references will be made to entomological notes in those periodicals which appeared prior to 1850. The titles of notes, articles, reports on works, will be entered under the name of authors, or of periodicals, especially agricultural reports and papers with brief digest of contents given in a line or two, in the same style as in Mr. Mann's excellent bibliographical record of *Psyche*, the organ of the Cambridge Entomological Club, of Cambridge.

After due pains are taken such a record will necessarily be quite imperfect. The compiler will have to rely much on aid from authors of any and every article or note in economic entomology. Its completeness will greatly depend on the care with which entomologists may prepare lists of their own articles. Entomologists are, therefore, earnestly requested to co-operate by sending full lists of their papers on any subject connected with *economic entomology* (not general or scientific entomology unless bearing on the applied science) and prepared in the style of that of *Psyche*, to the undersigned, at Providence, R. I. Very respectfully,

A. S. PACKARD, JR.

ON A VARIETY OF CATOCALA NEBRASKAE, Dodge.

BY G. M. DODGE, GLENCOE, NEBRASKA.

Catocala Nebraskae Dodge, var. *Somnus.*

Fore wings, head and thorax black, thinly powdered with gray scales. Abdomen and long scales at base of hind wings clear black. Fringes of wings as in typical specimens. Legs and under side of body dark. All the lines on fore wings indistinct, being merged in the ground color. Two ♂'s. Glencoe, Neb.

Normal *Nebraskae* has fore wings, head and thorax light gray, sprinkled with black scales. Abdomen pale brown. Lines black and very distinct.

A LIST OF THE BUTTERFLIES FOUND AT POTSDAM, N. Y.

1. P. asterias, Drury ; common last of June and July.
2. turnus, Linn. ; very common May and June.
   Arctic form ; common May and June.
   Orange var., shown in Edward's Plate iv., Pt. vi. ; scarce.
3. oleracea, Harris ; scarce, July.
4. rapae, Schrank ; generally very common all summer.
5. var. nov. angliae, Scud. ; rare, but one specimen taken July 19, '77.
6. Colias philodice, Godart ; very common all summer.
7. D. archippus, Harris ; generally common, August.
8. A. aphrodite ; scarce, August.
9. myrina ; common, July.
10. bellona ; rather common, July.
11. M. phaeton, Drury ; common a short time in June, very local.
12. V. antiopa, Linn.; very common in Oct., worn specimens early in April.
13. P. cardui, Linn. ; generally common June, quite scarce 1878.
14. V. milberti, Godt. ; rather common last of May and during June.
15. P. atalanta, Linn. ; " " "
16. V. J-album ; rare, but one specimen taken.
17. P. Huntera common May & June.
18. L. misippus ; common, July.
19. arthemis, Drury ; very common middle of June.
20. S. nephele, Kirby ; common last of July, Aug. and first of Sept.
21. G. c-argenteum, Kirby ; " " " "
22. L. violacea ; early in May. about Rhodora
23. C. Americanus. common. May & July.
24. P. Virginiensis scarce in May.
25. P. Crines. June. 27 P. Pecklus (ramentella)
26. A. Cybele July 28 Thecla — ?
29 H. Eunetus - 30 " — ?

The Canadian Entomologist.

VOL. XIII. LONDON, ONT., MARCH, 1881. No. 3

ENTOMOLOGY FOR BEGINNERS.

THE SATELLITE SPHINX—Philampelus satellitia Linn.

BY THE EDITOR.

This is one of the most beautiful of our Sphinx moths, a rare as well as lovely creature, and an object highly prized by collectors. It is found throughout the northern United States and occasionally in Canada, but is no where very common.

Fig. 4.

The moth (fig. 4), when its wings are expanded, will measure from four to four and a half inches across. Its color is of a light olive mixed with gray and varied with patches of a darker olive green, rich and velvety, and some portions with a rosy hue. The moths appear in July, when after pairing, the female deposits her eggs singly on the leaves of the grape-vine or Virginia creeper (Ampelopsis quinquefolia), where they shortly hatch into small green larvæ of a pinkish hue along the back and with a very long pink horn at the tail. As the caterpillar increases in size the tail becomes shorter, and after a while curves round as shown at

c in fig. 5. As the larva approaches maturity it changes to a reddish brown color, and after passing the third moult entirely loses the caudal horn, which is replaced by a glassy eye-like spot. The mature larva when in motion, as shown at *a*, fig. 5, will measure nearly four inches in length, but when at rest it draws the head and two adjoining segments within the fourth, as shown in the figure at *b*, which shortens its length nearly an inch, giving it a very odd appearance with its anterior portions so blunt and thick. It is of a rich reddish brown color, of a lighter shade along the back, with five or six nearly oval cream-colored spots along each side from the fifth to the tenth segments inclusive; sometimes the spot on the fifth segment is indicated by a dot only, in other instances entirely wanting. On the anterior segments there are a number of black dots; a dark polished raised eye-like spot in place of the tail; stigmata black, showing prominently in the cream-colored spots along the sides.

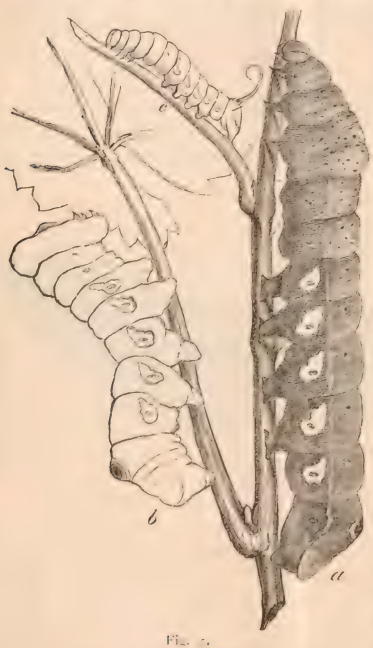

Fig. 5.

It is a very voracious feeder, and where present strips the vine so rapidly of its leaves that it soon attracts attention. When full grown it descends and buries itself in the ground, where it forms an oval cell within which it changes to a chrysalis.

The chrysalis is of a chestnut brown color with the segments roughened with impressed points, the terminal ring having a long thick spine. The insect usually remains in the chrysalis state until the following summer, but sometimes it hatches the same season. In the 9th vol. of the

CAN. ENT., p. 120, an instance of this sort is recorded by Mr. R. Bunker, of Rochester, where the larva became a chrysalis on the first of August and produced the moth on the 10th of September. Should these larvæ at any time prove troublesome, they can be readily subdued by hand-picking.

LIST OF N. AMERICAN ANTHOMYIDAE, EXAMINED BY R. H. MEADE, ESQ., BRADFORD, ENGLAND.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

Mr. R. H. Meade has kindly examined the N. American Anthomyidæ of the Museum of Comparative Zoology in Cambridge, forwarded to him by the Baron von Osten Sacken. The collection was returned last year by the Baron to the Museum. The species are separated carefully and accompanied by a list giving the genera and species, the latter not named except when identical with European species. The notes and determinations of the list differ sometimes from the notes previously published by Mr. R. H. Meade in the Entom. Monthly Mag., 1878, xiv., p. 230–250. Those differences and the more complete statements in the list induced me to publish it, thinking it to be ungrateful to Mr. Meade that his extensive and thorough examination should rest in the archives of the Museum and be lost to science. Baron von Osten Sacken stated in his letter that he has not the intention to work out the Anthomyidæ. I have carefully compared the labeled types in the Loew collection, and have added always the locality for the species examined by Mr. Meade. Where I was able to make out identities, they are given. The collection of the Museum, out of which the Baron himself selected the lot sent to Mr. Meade, will probably contain only duplicates of the lot, except in later additions. Loew's collection contains a number not yet assorted and some new species. Types of European species sent by Loew, Schiner, Gerstaecker and Imhoff, have been compared with the American ones. O. Sacken's Catalogue has 139 N. Amer. species, including a large number of Fr. Walker's not yet scientifically compared. Mr. Meade has counted (with a few varieties) 121 species, and Loew's collection contains 12 species not seen by Mr. Meade; therefore the whole number of N.

Am. species is 133. Mr. Meade has identified among them 27 European species and Loew 7 more; therefore 34 species seem to be identical with European ones. The Museum owes the most sincere thanks to Mr. Meade and to Baron v. Osten Sacken.

Genus Hyetodesia Rond. (Aricia pt. Macq.)

1. Bears a considerable resemblance to *Aricia marmorata* Zett.; 8 male and female; Lake Super., Huds. Bay Terr., Can., N. Hampsh.

   No specimen of *A. marmorata* is at hand. I consider *A. morioides* Zett. (perhaps *A. mori* Zett. of O. Sack. Cat., p. 164) to be identical with No. 1. Loew's type is a female from Sitka (Sahlberg), and an *Aricia*.

2. Is perhaps a variety of No. 1; the longitudinal thoracic stripes are narrower; 2, male and female; Lake Super., N. Hampsh.

3. Closely corresponds to the descriptions of *A. serva;* this is perhaps also a var. of No. 1; 1, female; Norway, Maine.

4. Seems identical with *A. lucorum* Fall.; 1, male; West N. Y.

5. Is very similar to *A. obscurata* Meig.; 1, male; Huds. Bay Terr.

6. Differs from any species I know; 4, male and female; Brit. Amer., Western N. Y.; Geysers, Cala.

   This species is *A. parviceps*, Loew collect., from Sitka, Sahlberg, male, female; the male agrees perfectly with No. 6; the female differs somewhat, but the 4 spec. of No. 6 seem to represent varieties.

7. Bears a very close general resemblance to *S. pagana* Fabr., but differs by having the eyes decidedly pubescent and also by having 3 instead of 4 thoracic bristles behind the suture; 2, male and female; Englewood, N. Jers.; Maine.

   This species is identical with *H. angelicæ*, Loew coll., male and female (*Spilogaster angelicæ* O. Sack. Catal., p. 165) and one European type sent by Loew as *Fellæa angelicæ* Scop. The differences quoted above agree with *F. angelicæ;* nevertheless the eyes are a little less pubescent in the only European specimen before me, but decidedly as pubescent in the 2 Amer. specimens in Loew's coll.

   There are in Loew's coll. the following species named, all different from the No. 1–7: *A. schinophora*, 3, male and female, from Sitka, Sahlberg, and from Alaska, related to No. 5 but different. *A. consors*, 2, male and female, from Sitka, Sahlberg, allied to No. 6.

A. spec., 1, female, from Wisc., *simillima A. Bilbergi*, differt tarsis anticis. In Ent. M. Mag., xiv., p. 250, Mr. Meade has mentioned a species closely resembling *A. lugubris* Meig. This species is not given in his list.

Genus MYDAEA Desv. (Spilogaster p. unspotted.)

8. Unlike any species I know; 1 female, Arctic Amer.

9. Corresponds to the description of *M. floricola* Desv.; 1 female, N. Y. This is *Spilog. urbana* Loew, O. Sack. Catal., 3, male and female, in Loew's coll. from Br. Amer. and Conn.; I cannot compare *M. floricola*, but the specimen No. 9 agrees with the European type of *M. urbana* sent by Mr. Meade.

10. Male, Canada; 11 females and 12 males, Western N. Y.; 13 females, Catskill Mts., N.Y.; 14 males, Canada; 15 males, Arctic Amer. Unlike any species known to me. No. 12 seems to be identical with *A. flexuosa* Loew, male and female, from Sitka.

16. Very similar to *M. flaveola* Fall., but has the external transverse vein straight instead of curved; 4, male and female, from White Mts., N. H.; Quebec, Can.; Huds. Bay Terr.; Catskill Mts., N.Y. In Loew's coll. labelled *A. diaphana* (*Limnophora diaphana* O. Sack. Catal., p. 166); 7, male and female, from N. Hampsh.; Me.; Brit. Amer.; the specimens are identical with European types of *A. diaphana* sent by Loew.

16.*a*. An imperfect species, very like *A. varians* Zett.; 1 male, Canada; abdomen wanting; agrees well with one European type sent by Loew.

Genus SPILOGASTER Macq. (spotted.)

† Legs black. All species unlike any known to me.

17. 3, male and female. Ky.; Lake Super.—18; 1 male, Huds. Bay Terr.—19; 1 female, Huds. Bay Terr.—20; 1 male, no loc.

21. 1 female, Huds. Bay Terr.—22; 1 male, no loc.

†† Legs wholly or partly yellow.

23. Differs from any species I know, but appears to be the analogue of *S. uliginosa* Fall.; 2, male; R. I.

I have compared European types of *S. uliginosa* sent by Mr. Meade and Loew, but they differ so strikingly from No. 23 that I am unable to say why they are analogous.

24. 1 male, Western N. Y.—25. 1 female, Cambridge, Mass. Both unlike any species known to me.

26. The generic position of this injured specimen is rather doubtful; 1 female, D. C.

27. Corresponds to Rondani's description of *S. hirticrura* and is very like *A. pertusa* Meig.; 7, male and female, from N. Y. and Ill.

I cannot compare *A. pertusa* nor *S. hirticrura;* the species is *Anth. trabeata* Loew; one type of Loew with his label is among the specimens No. 27; in Loew's coll. there are 7 specimens from N. Y., Ill., Pa., D. C.

Mr. Meade says, Ent. M. Mag., *l. c.* p. 251: In *Spilog*, there were eleven species. . . . There was only one male in the collection, and it bore a remarkable resemblance to *Cyrtoneura meditabunda* Fabr. The fifth longitudinal wing vein was curved in a similar manner towards the fourth vein, though in a less degree. . . .

There must be some misunderstanding here which I am not able to solve, as the eleven species before me contain 12 males belonging to 7 species. I have compared every one carefully with a type of *Cyrt. meditabunda* sent by Loew, without finding any male corresponding to the characters of *C. meditabunda*. Later I found among the Diptera not seen by Mr. Meade one female very well agreeing with the characters mentioned, bearing a label *M. meditabunda?* written by O. Sacken.

Genus Hydrophoria Desv.

28. Unlike any species known to me; 1 female, Connecticut.

29. Resembles *M. ambigua* Fall.; 1 male, Huds. Bay Terr.

30. Unlike any species known to me; 1 female, Brit. Amer.

Genus Drymeia Meig.

31. A well marked species which differs slightly from the only European one, *D. hamata*, 4, male and female, from Huds. Bay Terr.

It is difficult to decide about the similarity with *D. hamata*, as the Amer. specimens are in a rather indifferent condition; the European types sent by Mr. Meade and Loew are much larger. Formerly, *l. c.*, p. 251, Mr. Meade had considered them to be quite distinct.

Genus Hydrotea Desv.

32. Appears to be identical with *H. dentipes* Fall.; 1 female, Canada.

In Loew's coll., 2 females, 1 from Sitka, Sahlb., with the same determination.

33. Seems identical with *H. armipes* Fabr.; 3, male and female, Cambridge, Mass.

In Loew's coll., 1 male from Nebraska with the same determination.

Genus Lasiops Meig.

34. Something like *L. canotans* Meig., but it is not identical; 1 male, Br. Colombia..

35. Not like any species known to me; 4, male and female, N. Hampsh.

Genus Osphyra Desv.

36. Similar to *A. leucostoma* Fall.; 5, male and female, from D. C., Mass., Maine.

In Loew's coll., 5 male and female, from Maine, New York, D. C., identical with No. 36, labelled *A. leucostoma.*

36.*a*. Not like any species known to me; 2, male and female, Canada.

Genus Limnophora Desv.

37. Somewhat resembles *A. compuncta* Wied., but has the eyes more widely separated in the male; 6 male and female, from Mass.; N. Y., D. C.; Hudson Bay Terr.

38. 1 male, N. Y.—39; 1 male, Connect.—41; 1 male, Huds. Bay Terr. —42; 1 female, N. Y. 43; 1 male, Mass.—43 *a* (lost) Huds. Bay Terr. All not like any species known to me.

40. Very like *Coenosia triangulum* Zett. This species might perhaps be placed in the genus *Coenosia*, as the eyes in both sexes are separated by a widish interval. But this occurs to some extent in nearly all the species of this genus; 1 male, Catskill Mts., N. Y.

L. stygia Meig., O. Sacken Catal., p. 152, in Loew's coll. from Sitka, Sahlberg, is not represented among the species examined by Mr. Meade. *L. triangulifera* Zett., †male, labelled by Loew, is in the collection of the Museum.

Genus Homalomyia Bouché.

44. Identical with *M. canicularis* Linn.; 11 male and female, from South Greenland; Mass., Maine, Conn.

In Loew's coll. are 10, male and female, N. Y., Maine, with the same determination.

45. Identical with *A. scalaris* Meig.; 8, male and female. Maine, Mass., Pennsylvania.

In Loew's coll., 12 male and female, D. C., Pa., Wisc., with the same name.

46. Identical with *M. prostrata* Rossi (*invisurata* Zett.); 2, male and female, N. Y., Mass. There are 3, male and female, from the same locality in the Museum's coll.

47. Probably only var. of *H. canicularis*; 4 females, Middle States, Mass.

49. Not like any species known to me; 1 male, N. Hampsh., abdomen wanting; the other from Hudson's Bay Terr., lost.

Probably *H. serena* Loew, but the specimen is too imperfect to be sure.

50. Not like any species known to me; 4 females, from South Greenland; N. Y. All imperfect.

There are in Loew's collection the following determined species: *H. manicata* Meig., from Sitka, Sahlb.; *H. serena* Fall., from Br. Amer.; *H. subpellucens* Zett., from Sitka, Sahlb.; *H. tetracantha* Loew, from Middle States; *H. femorata* Loew, from Cuba. The *H. spathulata* Zett. quoted with * in O. Sack. cat., p. 170, is not represented.

Genus Azelia Desv.

51. Seems identical with *A. Slaegeri* Zett.; 1 male, N. Hampsh.

Genus Atomogaster Macq.

Is not among the specimens examined by Mr. Meade, but represented in Loew's coll. by 5, male and female, from Texas; Nebr. *A. albicincta.*

Genus Anthomyia Meig.

52. Identical with *M. radicum* Linn.

53. 3 males, Regio. arct.– 54; 1 male, probably Mass.—55; 1 female, Cambridge, Mass.—56; 2, male and female, no loc.—58; 1 male, Illinois. All not like any species known to me.

57. Identical with *A. latitarsis* Slaeg. & Zett.; 2, male and female, from N. Hampsh. and N. Y.

59. Very similar to small specimens of *A. pluvialis*; 1 male, Long Island, N. Y.

Genus Hylemyia Desv.

† Legs black.

60. Not like any species known to me: 10, male and female, Brit. Am., N. Y., N. J.

61. Not like any species known to me : 5, male and female, N. Hampsh., N. Y., Conn.

62. Resembles *H. antiqua* Meig.; 2, male and female, Hudson's Bay Terr., Reg. Arctic.

Is identical with *H. deceptiva* A. Fitch, 2 types in Loew's coll.

†† Legs yellow.

63. Not like any species known to me; this is perhaps *A. alcathoe* Walk. Mus. Cat.; 6, male and female, N. Hampsh., N. Y., Mass.

Is identical with *A. tarsata* Sik., male and female, N. Y., Ill., labelled by Loew.

In Loew's collection are 2 males from Cuba, types of *H. angustifrons* Loew, united (O. Sack. Cat., p. 167) probably after examination of Macquart's type with *H. pici*. Loew has written on the label : " Can be taken to be *H. pici*, if it is assumed that the artist has allowed himself wild fancy in drawing the veins of the wings and the bristles of the legs." On the label of the second specimen is said : " Probably the pale-winged variety quoted by Wiedeman as his *quadrilineata*."

64.—73. Unlike any species known to me. 64. 4, male and female, N. Y.—65; 1 female, N. Y.—66; 2 females, N. Hamps.—67; 1 female, Hudson's Bay Terr.– 68; 1 male, D. C.– 69; 3 females, Hudson's Bay Terr., Canada, N. Hamps.—70; 3 males, N. Y.—71; 2 females, Lake Super.— 72; 1 female, Maine.—73; 3 females, Nebraska.

Genus Chortophila Macq.

† Legs black.

74. Very similar to *C. floccosa* Meig.; 1 male, Mass.

75. 1 male, Mass.—76; 1 female, California— 77; 1 male, Regio Arct.—All unlike any species known to me.

78. Seems identical with *A. angustifrons* Meig.; 5, male and female, Br. Amer., Maine, Mass.

Is identical with *Anthom. caloptcni* Riley, infesting the eggs of *Caloptenus spretus*, after the types in the Museum sent by Mr. Whitmann from St. Paul, Minn.

79.—85. 85 *a*. Not exactly like any species known to me. 79. 1 male, Hudson's Bay Terr.—80, 1 male, N. Y.—81; 1 male, Canada—82; 1 male, N. Y.—83; 1 male, Hudson's Bay Terr.—84; 10, male and female, Hudson's Bay Terr., Maine, N. Y., D. C., Arctic Reg.—85; 8 females, Mass., Conn., N. Y.

†† Legs yellow.

86.—92 and 96–101. Unlike any species known to me. 86, 1 male, Conn.—87, 2 females, Conn.—88, 1 male, Cala—89, 3, male and female, N. Y.—90. 5, male and female, N. Y.—91. 7, male and female, Mass., bred from Rumex by O. Sack.—92. 1 male, N. Y. —96. 1 female, Hudson's Bay Terr.—97. 1 female, no loc.—98, 1 female, South Greenland. 99, 1 female, Hudson's Bay Terr.—100, 1 female, no loc.—101, 1 female, Regio Arct.

93. Resembles *A. gilva* Zett.; 2 females, N. Y.

94. Very like *A. vittigera* Zett.; 3, male and female, N. Y.

95. Very like *A. flavoscutellata* Zett.; 1 male, N. Hampsh.

In Loew's coll. one species with black legs from Texas is labelled f. *Chort. cilioraca.*

Genus Lispa Latr.

102. Like *L. tentaculata* Deg.; 2 females, N. Y.

Identical with *L. sociabilis* Loew; 5, male and female, D. C.

103. Like *L. oliginosa* Fall.; 1 female, Hudson's Bay Terr.

Identical with the same species by Loew from Ill.

104. Not like any European species; 1 female, Maryland.

In Loew's collection are *L. flavicincta* from Hudson's Bay Terr., and *L. consanguinea* from Texas.

Genus Caricea Desv. (Cœnosia Meig.)

105. This very distinct species, of which there are many specimens, is different from any European one that I know; the female closely resembles that of *Mydaea impuncta* Meig. 27, male and female, from Hudson's Bay Terr.; Canada, N. Hampsh., Mass., N. Y.

Genus Coenosia Meig.

106–115; 117–121. Not exactly like any species known to me; 106, 4, male and female, N. Y.—107. 3 females, Cuba, is labelled in Loew's coll. *C. strigosa* Loew. 108. 4, male and female, Mass.—109. 3, male and female, N. Hampsh., C. D., is *C. subsimplex*

Loew (not described) from D. C. 110. 2 females, Rhode Island —111. 1 male, Canada—112. 1 male, Canada—113. 2 females, Conn. 114. 1 female, D. C.—115. 3 males, N. Hampsh., Conn., D. C., is *C. calopyga* L. from Pa.—117. 4, male and female. Hudson's Bay Terr., N. Hampsh., C. D.—118. 1 male, Hudson's Bay Terr —119. 2, male and female, Canada, Mass.—120. 1 female, Hudson's Bay Terr.—121. 1 male, D. C.

116. Very similar to *C. pygmaea* Zett.; 1 male, Canada.

In Loew's coll. is also *C. modesta* from Washington Terr., not from Washington, D. C., as in O. Sack. Catal., p. 171; and *C. nivea* from Pa.

Genus SCHOENOMYZA Hal.

In Loew's coll. are the types of *S. chrysostoma* from N. Hampsh, and *C. dorsalis* from D. C.

NEW SPECIES OF CYNIPIDAE.

BY H. F. BASSETT, WATERBURY, CT.

CYNIPS Q. CALIFORNICA, n. sp.

Galls: Polythalamous, sessile on the branches of the Californian White Oak (Quercus Hindsii?) Sub-globular, but varying much in form and size. A common form is what may be termed balloon-shaped, the upper part perfectly globular, the lower tapering more or less to the sessile base. They often occur of a long compressed oval form: these are placed longitudinally on the branch and the length is two or three times their breadth or thickness. Those of this form are often of monstrous size, being ten or twelve inches in their greatest circumference. The globular galls are from one to two inches in diameter. In color they are of an opaque white. They are usually smooth, but specimens occur that have a more or less warty surface, and others are found that have slight yellowish brown ridges. Internally they are of a uniform, dense cellular structure, and the not very numerous larval cells (from one to a dozen) lie closely imbedded in this cellular substance.

From their shape and color these galls might easily be mistaken for a species of white fungus which grows on trees.

My specimens were collected in 1878 and in 1880 at Redwood City, Cal., by Mr. Wm. Sutton, of San Francisco.

There are some very large specimens of these galls in the Museum at Cambridge, collected in Cal. by Baron Osten-Sacken, I believe. They are, with a single exception (*Cynips punctata* B.), the largest galls known to me, and I have given them the name of the State in which they, and so many other natural objects of surprising magnitude are found.

The insects gnaw their way out of the galls in October, but of the growth of the galls themselves I have no information. The insects are all females, and belong to the agamous generation, and in structure they differ but little from *C. inanis*, *C. aciculata*, *C. spongifica* and many others that are, as yet, known only in the female sex.

The insect is described as follows :

Head small ; ocelli medium size, very close together. Face covered with short white hairs which are appressed, and which converge towards the mouth. Mandibles large and heavy, shining black at the tips. Maxillary palpi 5-jointed, labial 3-jointed. Antennæ with fourteen joints ; 1st joint short, rather thick ; 2nd small, globose ; 3rd equal in length to the two preceding together ; 4th to the 13th gradually shorter ; 14th long as the two preceding taken together. Thorax with short appressed hairs, and with grooves as follows : Two parallel lines start near together on the collare, near the dorsal summit, and extend half way to the scutellum ; two similar but rapidly diverging lines from the same point on the scutellum, extending half way to the collare. Two starting from the scutellum outside the first pair, and extending to the base of the wings ; these last are nearly parallel. All these grooves are smooth and shining, but very fine and only seen to advantage under a magnifier.

Scutellum nearly oval, surface slightly shagreened and with a few scattering white hairs. Foveæ indistinct or wanting.

Pleuræ and legs covered with short shining white hairs. Tarsi dark brown, ungues black. Basal half of the first abdominal segment hairy. Sheath of the ovipositor dark shining brown, not exserted. Ventral hairs microscopic.

Wing veins dark brown, surface of the wings covered with short fine hairs ; radial area open, areolet of medium size. The head—except from the mouth to the occiput, which is black—the antennæ and the entire

insect, including the wings, with the slight exceptions noted above, a *dusky yellowish brown*. Length .22; wing .23; antennæ .13.

Described from living specimens.

CYNIPS Q. AGRIFOLIAE, n. sp.

The galls from which I have reared this really fine species were sent me from California by my brother, H. D. Bassett, of San Francisco, with a branch and leaves of the oak on which they grew. They grow on the twigs of Quercus agrifolia, one of the family of evergreen or live-oaks. The first specimens sent me reached me in November, 1877. From these perfect insects appeared Dec. 21st, 1878. Whether the larvæ matured earlier or later in the warm room in which they were kept, than they would under normal conditions, I cannot say; but from what I know of other species, I judge this had little effect upon their development.

As they mature in the autumn, and as all that I have yet reared are females, and as these bear a close resemblance to the other agamous species known to me, I conclude that these are the one-gendered generation of a dimorphic form. The gall fly is even lighter in color than *C. Californica*, and these two species differ very greatly in this respect from any other species known to me.

Galls: Monothalamous, perfectly round, very hard, and internally of a dense cork-like consistence, like the galls of *C. globulus*. They are from $\frac{3}{4}$ to $\frac{3}{8}$ of an inch in dimater. The surface is microscopically pubescent and uneven, and the color varies in different specimens (dry) from a rather dark, dull clay color to that of raw umber. The single larval cell is adherent on all sides to the gall substance. The point of connection of the gall with the twig is scarcely discernible in most specimens, in others it is indicated by a minute dot from which fine lines radiate. I learn that these galls are so abundant that the ground is sometimes almost covered with them.

Gall fly: Head, and with slight exceptions, the entire body, are extremely pale yellowish brown, the head and the lower part of the abdomen palest, the first somewhat translucent. Eyes, ocelli and the tips of the mandibles jet black and contrasting beautifully with the prevailing color. Antennæ 14-jointed; 2nd half the length of the 1st, not globose; 3rd long; 4th to 8th gradually shorter, the remaining six short and of equal length. The antennæ light, deepening to dark brown towards the extremity.

Thorax very finely punctate on the mesothorax, coarser and less regular on the scutellum and with scattered microscopic hairs throughout. Parapsidal grooves: These differ considerably from the usual form, inasmuch as the anterior parallel pair are perceptible only under a powerful lens and appear as smooth shining undepressed lines, and the two diverging lines which rise on the posterior margin reach quite to the collare. These last are very distinctly impressed, as is also the line over the base of each wing. Foveæ small, appearing as a shallow, smooth groove at the base of the mesothorax. There is a scarcely perceptible ridge dividing the groove in the middle. On the breast there is a black spot which is usually quite concealed by the head, and also a dark brown spot on the posterior angle of the thorax; this is concealed by the wings when they are closed. Legs the same color as the body, except that the tarsi are dusky brown and the ungues black.

Wings of a decidedly yellowish hue. Veins slender and pale, areolet distinct; radial area open, long and very narrow.

Abdomen large; 1st segment with a dark, highly polished spot on the anterior dorsal margin, and laterally there are a few fine hairs; 2nd and 3rd segments each with a dark nebulous spot, similarly situated, but less intense and less sharply defined than that on the first segment. Sheath of the ovipositor not exserted, a little darker than the general surface of the body, and with short hairs or bristles along its whole length. In the living specimens there is on each side of the sheath a dark curved line, and seen from beneath these form an elliptic oval. Length .15; wing .18; antennæ .13.

Described from numerous living specimens.

Cynips Q. Suttonii, n. sp.

Hard woody galls forming a prodigious enlargement of the small twigs and branches of Quercus sp.? from Cal. They vary in size from one-half to more than two inches in diameter. Most are globular, while a few are elongated in the direction of the twig which they surround. The wood is very hard, and is curled and twisted as in woody knots generally. The bark is smooth, and in young galls polished and shining. Extending from the centre of the gall quite to the bark, but not piercing it, are a large number of rounded and sub-compressed hollow tubes, closed and bluntly rounded at the base, and flat and slightly enlarged at the top. They are one-half inch in length and three-sixteenths in diameter. It is

not difficult to remove these tubes or larval cells from partially dried galls. Their thin walls are formed of long straight woody tissue. In the basal third of the tubes are the larval cells, one in each, and above the larva is a thin paper-like partition so concave beneath as to form, with the sides and bottom, an oblate spheroidal larval cell. Above the partition are a few shreds of a pith-like substance that filled the entire tube while growing. The bark is all that offers serious hindrance to the egress of the insect when mature.

I have been thus particular in describing the structure of this gall because several other species known to me have a structure somewhat similar and I do not remember to have seen them described.

Gall-flies : All females. Head black, and with the entire thorax covered with short appressed hairs. Vertex slightly rugose. Antennæ dull dark brown, 15-jointed ; 1st joint large, club-shaped ; 2nd short, ovoid ; 3rd a little longer than two preceding taken together ; 4th to the 9th each slightly shorter than the preceding one ; 10th to 14th of nearly equal length ; 15th very short and small, but separated from the 14th by a very distinct suture. Face black, mandibles dark. Thorax with two short smooth parallel lines, not grooves, which extend half way from the collare to the scutellum, and two outside of these also parallel, which extend half way from the scutellum to the collare ; also a smooth line over the base of each wing. All these lines are smooth and entirely destitute of hairs, and in certain lights they appear as slightly raised ridges, rather than as furrows, as is the case in other species when the parapsidal lines are present. Legs dark brown, nearly black, except the femur, which is a clear shining brown. Ungues black. Wings hyaline, subcostal and first transverse veins heavy, others slender, but distinctly defined ; all dark dusky brown, almost black. Areolet large, cubitus very slender, in some cases not quite reaching the first transverse. Radial area open and the radial vein straight.

Abdomen clear shining brown ; first segment in size equal to the three following taken together. Microscopic hairs on this segment beneath the wings. Sheath of the ovipositor dark brown and with the ventral valves, has fine short hairs along the entire length, but no tuft of these at the point of either, as in most species.

Length : Body, .15, wing .20, antennæ .08.

I first received this species from Mr. William Sutton, of San Francisco, Cal., to whom I am also indebted for other interesting species of

galls from that section, and I take pleasure in giving to it the name of its discoverer.

CYNIPS Q. NUBILA, n. sp.

Galls: Densely hairy, sub-globular or hemispherical clusters of galls on the under side of leaves of an unknown species of oak; always on the mid-vein. When fresh the hairs are of a fine deep crimson, but fade somewhat in drying. At the base they are yellowish white. The galls in each cluster grow from the same point on the leaf, and the clusters are from one-half to one inch in diameter, and contain from one to five or more galls or larval cells. The cells, denuded of their covering of hairs, are nearly globular, tapering, however, to an obtuse point at the end attached to the leaf, and they measure from three-sixteenths to nearly or quite half an inch in diameter. The shell is about .02 of an inch in thickness (thicker than this at the base, however,) and is very hard and brittle when dry; it contains no larval cell, and its inner surface is slightly roughened as if gnawed.

These galls, in their dense hairiness and in their size and outward appearance, resemble closely those of *C. q. tenuicornis* n. s. from the same locality; but while in this species the larval cells are separate, in *tenuicornis* they are enclosed in an envelope of a dry porous consistence. The fine crimson color, too, seems to be a constant character of *C. q. nubila*, and the insects from the two galls are widely different.

Gall-fly: All females. Head very small, dark reddish brown. Vertex finely punctate or crackled. Ocelli shining, of medium size. Antennæ 13-jointed, rather slender, the base prominent; 1st joint tapering from its abruptly truncate summit; 2nd short, ovoid; 3rd one-fourth longer than the two preceding taken together; 4th equal to the 1st and 2nd; 5th to 8th gradually shorter; 9th to 12th sub-equal; 13th slightly longer than the 12th. The joints, particularly the 3rd, 4th and 5th, closely connected, but with a slight enlargement at the nodes in these last mentioned.

Thorax very dark reddish brown, in certain lights appearing black, covered with very short appressed hairs, which give a slight ashen hue to the surface as seen with the naked eye. Two fine, smooth, rather indistinct parallel lines reach half way from the collare to the scutellum, and two distinct grooves from the collare, converging towards the scutellum and increasing in size as they approach that point. Scutellum distinctly wrinkled or rugose. Legs very dark reddish brown, somewhat shining,

and paler and sub-translucent at the joints. Wings very large, hyaline. Veins heavy, black. Areolet very small, radial area open, broad. The base of the radial area covered with a dark semi-transparent cloud which includes the 2nd transverse vein. The cubitus in this species, as in *C. q. bella*, is heaviest towards the 1st transverse. At their intersection there is a dark cloudy spot, and a still larger ashen cloud near the tip of the wing This last does not touch the veins nor the margin of the wing.

Abdomen very large, and viewed laterally, nearly circular in outline; 1st segment a little longer than the four following taken together. These last are sub-equal, and each of a deep yellowish brown on the posterior half, but lighter anteriorly. All the light bands, together with the lateral portion of all the segments, covered with minute microscopic hairs. Sheath of the ovipositor small, with a brush of rather long hairs at the apex.

Length: Body .15, wing .20, antennæ .13. This fine and truly remarkable species was collected in the Mule Pass Mts. in Arizona, in Nov., 1879, by Prof. E. T. Cox, to whom I am indebted for many other interesting species.

COENONYMPHA ELKO.

BY W. H. EDWARDS, COALBURGH, W. VA.

Male: Expands .95 to 1 inch.

Upper side pale ochre-yellow, immaculate; fringes concolored.

Under side of primaries nearly same ochre-yellow over basal area and part of disk, limited without by a slightly sinuous and crenated edge of deeper color, much as in the allied species: outside this, slightly ochraceous next inner angle, but yellow-buff over apical area.

Secondaries have the basal area uniform gray-brown, the outline distinct and in strong contrast with the remainder of the wing, which is yellow-buff. Very slightly dusted gray; the outline is irregularly crenated, with a deep sinus on upper sub-costal interspace and another on lower disco-cellular interspace.

Female: Expands 1 inch to 1.02.

Upper side like the male. Beneath, the area just outside the crenated edging on disk of primaries is yellow for a little distance, then tinted

ochraceous to margin; in one example a minute black dot in the disco-cellular interspace with white centre; in another no dot; secondaries as in the male, the basal area one shade of gray, with distinct crenated outline, and beyond a yellow or buff ground to margin, very little dusted gray.

From 2 ♂ 2 ♀ taken at Elko, Nev., 1880, and sent me by Mr. J. Elwyn Bates, of So. Abington, Mass. Mr. Bates informed me that he had quite a number of examples. The present species is nearly of same color with C. *ampelos* Edw., from Oregon; on upper side a little more yellow, and with less gloss. The under side is much lighter, and on secondaries the contrast between the dark basal area, with its clear cut outline and the pale yellow extra discal area, is great. *Ampelos* has the under side of same general character as *Inornata* Edw. (only different in coloring), from Montana and Winnipeg. *Elko* resembles *Californica* Bois. rather, in which species many examples have the basal area dark and the entire outline of same distinctly defined.

COLLECTION NOTES FOR 1880.

BY JAMES T. BELL, BELLEVILLE.

The early months of 1880 were especially favorable to the acquisition of the hybernating Coleoptera, and those which have their permanent habitat among the moss of our woods and swamps. The early disappearance of the snow laid bare their hiding places, while the frosts which succeeded formed an ice-bridge which gave access to their places of refuge, which in ordinary seasons remain covered with snow till the general break-up of the winter, when they are rendered inacessible by being surrounded or covered with water. Mr. J. D. Evans and myself, who are the sole representatives of the Entomological Society in this district, took advantage of these favorable circumstances and commenced a vigorous course of moss-hunting, lasting from March 1st to May 24th. During this period we collected upwards of 1,000 specimens of over 100 species, of which the following are not included in the Society's published lists. The numbers are those of Crotch's Check List, and the determinations, with few exceptions, were made by Mr. H. Ulke, of Washington, and Mr. E. P. Austin, of Boston.

7496 Anchus pusillus.
Hydrochus (nova species, Ulke).
1579 Trichopteryx Haldemanni.
" 2 sp. (nova species, Ulke.)
2102*a* Pselaphus longiclavus.
2110 Bryaxis conjuncta.
2120*a* B. propinqua.
2134 Decarthron formiceti.
2139 Arthmius globicollis.
2295 Scydmænus bicolor.
" 2 species not determined.
2366 Latridius deletus.
2572 Atomaria ochracea.
5670 Xanthonia Stevensii.
5771 Plagiodera cochleariæ.
6294 Paratenetus gibbipennis.
9027 Tanysphyrus lemnæ.
9293 Ceutorrhyncus semirufus.
1818 Philonthus palliatus.
7749 Stilicus biarmatus.

All the above were taken from moss, and in addition the following, which are already registered as Canadian: 2095, 2100, 2102, 2103, 2113, 2124, 2130, 2149, 2150, 2164, 2283, 2285, and about 70 species of Carabidæ, Staphylinidæ, Chrysomelidæ, Curculionidæ, etc.

3932 Alaus gorgops; from a stump in Bleecker's Woods.

On June 7th we experienced a heavy gale from the S. W., and on the 12th one of my daughters, who was visiting at West Lake, Prince Edward County, went with a pic-nic party to the Sand Banks, on the shore of Lake Ontario. There she found the beach strewn with Calosomas and other Coleoptera. On her return she brought me 16 *C. scrutator*, 13 *C. Wilcoxi*, 1 *C. frigidum*, and many other beetles. On July 1st, Mr. W. R. Smith being at Brighton, found on the beach at Presq' Isle a similar display of Calosomas, and brought me 14 *C. scrutator*, 24 *C. Wilcoxi*, and 3 *C. frigidum*; unfortunately most of them were spoiled from exposure.

In June I had brought to me a rather fine specimen of *Eacles imperialis*, and a good male of *Xylorytes satyrus*, both taken within half a mile from the city limits.

With these exceptions, the season of 1880 has proved the least favorable to the Entomological collector, in this quarter at least, of any I have experienced in my 21 years' residence in Canada. Very few Lepidoptera were seen, either on the wing or at sugar; beating the bushes was singularly unproductive, and I have more than once picked stumps and turned over stones for a full hour without getting 20 specimens of all sorts.

CORRESPONDENCE.

CORRECTIONS.

In the paper on the early stages of *Gracilaria stigmatella*, ante pp. 25–28, occur the following errors, no doubt overlooked by me in the proof: On p. 26, "85 mm." and on p. 27, "8 mm." and "6 mm.," for which respectively read .85 mm., .8 mm. and .6 mm. (fractions instead of integers). And on p. 28, line 13, for "mine" read cocoon.

V. T. Chambers, Covington, Kentucky.

FOOD HABITS OF THE LONGICORNS.

In June, 1873, while collecting in a small swamp on Montreal Mountain, I caught a specimen of *Pogonocherus mixtus* Hald. on my coat-sleeve, and as the insect was new to me, I commenced a search for others. Upon examining a dead branch of a small willow growing close by, I found that it had been extensively bored by some small insect. The part attacked was about three feet from the trunk, and at this place the branch, for about twelve inches, was full of holes from which the insects had escaped. Not finding them, I searched further along the branch, and near its extremity, where it was reduced to the thickness of a twig, I found a number of the above-named species. They were lying on the branch with their bodies pressed closely against it, and in this position could with difficulty be distinguished from the withered buds. I observed several pairs in coitu, but none of the females were ovipositing. They appeared to be very sluggish, lying almost motionless, although the sun was shining brightly at the time. Having bottled all that were to be seen, I cut off the branch where it had been perforated and found a number of the beetles in it, but neither larva nor pupa.

Gaurotes cyanipennis Say.—I find this insect in spring on thorn blossoms, and later in the season pairing and ovipositing on butternut.

F. B. Caulfield, Montreal, P. Q.

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DESCRIPTION OF THE PREPARATORY STAGES OF TERIAS NICIPPE, Cramer.

BY W. H. EDWARDS, COALBURGH, W. VA.

EGG.—Long, narrow, fusiform, thickest in the middle, tapering about equally to either end; the two ends nearly equal, small, blunt, the upper one rounded; the sides marked by many low, narrow, longitudinal ribs, about 30 in number; in shape much resembles egg of Colias *Philodice*, but the ribs are more numerous and less prominent, and there are no cross striæ. Color, when first laid, greenish-yellow; after a few hours turning to red. Duration of this stage in midsummer 2 to 3 days.

YOUNG LARVA.—Length .6 inch; cylindrical, nearly even, each segment at its anterior end a little smaller than the posterior end of the next preceding; color whitish, semi-translucent; a few whitish clubbed appendages scattered about each segment; legs and feet color of body; head a little broader than 2, obovoid, greenish-white. To 1st moult in July 2 to 3 days.

After 1st Moult.—Length .16 inch; slender, even, head as broad as 2; color of body deep green; dorsum, the sides and lower parts lighter; each segment transversely crossed four or five times, and on the ridges so caused fine tubercles, some of which put out short clubbed white appendages, others short hairs, white or black; head sub-globose, finely tuberculated and somewhat pilose; yellow-green. To next moult in July 2 days.

After 2nd Moult.—Length .2 inch; same shape; color wholly deep green; head as before, lighter green than body. To next moult in July 2 days.

After 3rd Moult.—Length .4 to .5 inch; same shape; deep green; a darker green vascular medio-dorsal line, the basal ridge pale green from 2 to 13; head as at preceding stage. To next moult 2 days.

After 4th Moult.—Length .6 to .7 inch; two days later reached maturity.

MATURE LARVA.—Length 1 inch to 1.1; cylindrical, thickest at 2 and 3, and tapering gradually to extremity; the three anterior segments curved down in a circular bend when at rest; dorsal surface pale green, the lower part of sides of a soft whitish-green; each segment creased four or five times, and on the ridges small tubercles, each of which sends out a short white or black hair; along the basal ridge a whitish stripe, most often immaculate, sometimes with an orange patch on each segment, and occasionally an orange line the whole length; under side, feet and legs pale green; head small, sub-globose, very little depressed at top, finely tuberculated, and with a few short fine hairs; color yellow-green. Two days after the moult the larva suspended, and twelve hours later pupated.

CHRYSALIS. Length .8 inch; long, slender, the ventral side greatly produced; head case conical, prolonged to a point, which is a little curved back; mesonotum low, rounded, followed by a slight depression; from this to posterior extremity the dorsum is a little convex; the wing cases cover the ventral prominence, and this is thin, rising to a narrow keel, the sides being a little excavated; from the summit of the keel the slope is regular to head, but posteriorly there is an abrupt curve down to abdomen; a slight ridge upon the side from end to end; color of dorsum pale green or whitish-green, with a darker medio-dorsal line; the wing cases and ventral side of abdomen yellow-green; the side ridges cream-color; so is the ventral carina, but where this approaches the abdomen it becomes brown and the dark color is dilated into an irregular stripe; on either side of head case, and also on lower side of same, are small brown patches, and near base of mesonotum at upper end are two pairs of small brown spots, edged posteriorly with white, the posterior pair the larger; the wing cases with several brown points, part of which are disposed in two rows near to and parallel with the hind margin.

Some chrysalids are quite largely sprinkled with brown dots and patches over whole anterior part, including wing cases, and the keel is brown. Two chrysalids bred in September, 1880, differed from all the rest in that they were black, or black-brown; the anterior parts darkest; one of these had the posterior part of the ventral prominence, beyond the wing cases, dull green; both had the two pairs of spots above mesonotum white. I thought it probable that these chrysalids were diseased, but

both gave imagos in no way differing from the usual form. Duration of the chrysalis stage in July and August 8 days.

Nicippe is a very common species in this part of West Va. Its food plant is Wild Senna, *Cassia Maritandica*, which grows abundantly, and the butterfly is present in several successive generations and in overlapping broods from early in May to winter. I have seen it on the wing 29th April, and also in December, and am of the opinion that a few individuals successfully hybernate. At almost any time eggs and larvæ can be found on the Senna leaves, many eggs perhaps dotted over the surface of a single leaf and mostly the under surface. On one occasion I noticed a butterfly just from chrysalis standing by its empty shell, on a stem of Senna, and near by were fresh-laid eggs and newly hatched larvæ up to mature larvae. I recorded at the time that there were about forty larvae on one stem. The larvae are very nearly the color of the leaves, and usually may be found, when at rest, lying full length along the mid-rib on upper side.

The butterflies differ much in size and color. The normal color is deep orange, but I have taken males of all grades up to clear sulphur yellow, with no trace of orange. The females also are often nearly yellow, but I have seen none which had not a little orange in the disks.

Nicippe is found over all the Southern and Western States, on the Pacific coast, and so to the tropics, avoiding the highlands. It is common about Pittsburgh, Pa., and is occasional as far to the eastward as Massachusetts. In 1877 I saw a single one flying near the coast, below Boston.

DESCRIPTION OF A NEW SPECIES OF EUDAMUS.

BY J. A. LINTNER.

EUDAMUS ELECTRA, n. sp.

Size of small *Nisoniades Juvenalis*. Primaries narrower than in *Eudamus Pylades* Scudd. ♀, more rounded on the costa, and more oblique on the hind margin. Secondaries rounded, not prolonged at the anal angle as in *E. Pylades*, nor excavated opposite the cell as in most of the Nisoniades.

General color dark brown, approaching that of *E. Pylades*; the fringe concolorous with the terminal portion of the wings, a little paler at their tips.

Primaries with eleven transparent white spots, upon which an ordinary lens shows regular rows of small black scales—the spots, as follows : Near the end of the cell (apparently open) are two spots, separated by the cellular fold and extending to the enclosing veins (subdorsal and median) —the upper one twice as large as the lower and prolonged backward superiorly in one or two teeth—the lower one subtriangular in shape ; above and in line with these two, in cell 10, is a small elongated spot—the smallest on the wing, while beneath them and in range, in cell 2, extending from vein 2 to vein 3, is the largest spot on the wing, enlarged superiorly and excavated inwardly. Outside of this discal band of four spots, are seven others, bordered by dark brown, and arranged in an irregular curve, as follows : in cells 9, 8 and 7, three costo-apical spots, oblique to the costa ; outside of these, in cell 6, a spot ; in cell 5, still nearer the margin, another ; in cell 4, a little farther removed from the margin, another—these last three subtriangular in shape ; in cell 3, extending from vein to vein, a subquadrate spot, placed farther from the margin, about equidistant with the lower costo-apical spot ; these seven spots, commencing at the costa and omitting the fifth, show a regular increase in size. Outside of these transparent spots, is a series of obscure dark brown intranervular subterminal spots which merge into the dark brown shade of the margin. Inside of these spots, the wing shows by oblique light a purplish reflection approaching a grape bloom but more vivid, with the exception of the internal margin and two brown bands of the color of the outer margin and posterior wings ; the bands extend from the subcostal to the internal vein ; the outer and broader embraces the discal band of transparent spots in its outer margin, and the other crosses the median vein at its intersection by vein 2 ; a brown shade rests also on the base of the wing.

Secondaries traversed at about their outer third by a narrow obscure brown band, inside of which the wing is dark brown ; outside of this band, the subterminal series of brown spots of the primaries is continued.

Beneath, the purplish reflection of the upper surface appears only at the tip of the wing—the median and basal portions being dark brown, concolorous with the secondaries inside of the paler brown band ; the obscure intranervular brown spots of the upper surface are repeated, and continued on the secondaries ; the transparent spots are without the lines of brown scales.

The costal vein of the primaries intersects the costa nearly opposite the end of the cell; vein 8 reaches the margin at the extreme apex—not below it.

Antennæ about one-half the length of the anterior wings, dark reddish-brown, marked inwardly with white at the joints, expanding rapidly into the club (the terminal half of the club lost).

Palpi in length about equal to the diameter of the eyes, clothed with thick, bristly, dark brown hairs, some of which are white tipped; apical joint short, conical, projecting a little beyond the hairs.

Locklet black, curving about half way over the eyes. Front of head dark brown.

Thorax above and beneath clothed with long brown hairs, concolorous with the posterior wings.

Abdomen darker brown, reaching only to the pale band of the hind wings.

Legs dark brown; the posterior pair have the femur and tibia of the same length, bearing brown hairs which nearly equal them in length; tibiæ armed with two pairs of spurs; tarsi twice as long as the tibiæ, moderately spinose.

Expanse of wings, 1.65 in.; length of body 0.55 in.

Described from a single female received from Mr. W. H. Edwards. The specimen was captured in Hamilton, Ontario, by Mr. J. Alston Moffat, in 1877, in company with another like it, which escaped capture.

In the Hesperidæ the antennal club affords excellent generic features. It is unfortunate that in this unique specimen, the half of one antenna and the terminal half of the club of the other, have been lost. It being also of the female sex, we are without knowledge of the presence of a costal fold in this species. In the absence of these characters, it is referred, with some doubt, to the genus Eudamus, in which Dr. Herrich-Schæffer, Dr. Speyer and others arrange species with rounded hind wings and those in which they are greatly prolonged. Of the three groups in which Dr. Speyer has divided the genus, viz., *Hind wings on submedian nervure little or not at all produced,—**Prolonged in a lobe,—***Caudated,—*E. Electra* falls in the first group.

The detection of the above species is a very interesting discovery for this portion of the United States.

NOTES ON CRAMBUS.

BY A. R. GROTE.

Crambus sericinellus Zeller.

I am indebted to Professor Fernald for specimens of this species from Maine. It appears in two forms ; one in which the thorax and fore wings are pure satiny white, which, from Prof. Zeller's description and a specimen sent him for identification, is the typical *sericinellus ;* the other, in which the white is somewhat faded, having a slight yellowish or fuscous cast. This latter, Professor Fernald informs me, corresponds to Clemens' type of *inornatellus*, a name which I have referred as a synonym in my preliminary List. It may be retained as a varietal name ; I do not think it can be specifically distinct ; in some undoubted *sericinellus* the thorax is a little soiled.

Crambus minimellus Robinson.

I have identified this species from a specimen in my collection from Massachusetts. It has very pointed fore wings, and the little species seems to me related to the *Leachellus* group.

Crambus undatus Grote.

This species belongs to the *exsiccatus* group ; it is smaller than *exsiccatus*, pale brown, the primaries washed with whitish, and having two dotted transverse lines, angulated on the disc, continuous and very distinct, not drawn in submedially. Fringes brown, with a silky or metallic shade. A fine series of terminal brown dots. Hind wings pale gray, with a faint subterminal line, discontinued inferiorly, visible also beneath. We have two Californian species, *anceps* and *undatus*, and two Eastern species, *exsiccatus* and *laciniellus*, which are allied in having the fore wings crossed by two brownish angulated uneven lines more or less continuous and differing in expression in each species.

Crambus occidentalis Grote.

Mr. Hy. Edwards considers this a distinct species and not a variety of *Leachellus*. It differs by the prominent notch of the white stripe on its lower edge at the middle, and by the dark shades accompanying the stripe below. It is collected about San Francisco. What I regard as the

same as our Eastern *Leachellus* has been collected by Mr. Edwards at Vancouver and also at Mendocino.

Crambus attenuatus Grote.

This species has been collected about San Francisco. The Californian specimens are a little brighter tinted and slightly exceed in size the material I had before me from Vancouver.

ON A NEW SPECIES OF APHIS AFFECTING THE PINE.

BY WM. H. ASHMEAD, JACKSONVILLE, FLORIDA.

Among our native forest trees, none, unless it is the oak, suffer more from the depredations of insect enemies than the pine. Distributed as it is—from the Arctic to the Tropics—climatologically speaking, it becomes a prey to every conceivable form of insect life.

Already its enemies may be reckoned by hundreds ; but notwithstanding this, hardly a year goes by without some careful investigator adding others to the list. It is not the intention of the writer to enter into full details or enumerate all of its foes, but to call the attention of entomologists to a new Aphis affecting a pine in Florida, that has evidently been overlooked by others.

For the past two years we have detected numerous large brown plant-lice upon the common pine of this region, *Pinus australis*, which for want of time we have left unmolested. They cluster together upon the new and tender branches, which they puncture with their remarkably long beaks, causing the sap to exude and the branch upon which they exist to become gummy and sticky. In their habits they are surprisingly shy and timid. On disturbing them they invariably seek safety by hiding between the needles of the pine ; indeed, even on hearing approaching footsteps, we have observed them cling closer to the limb, while a few skelter off where the needles are denser.

In looking up literature on the subject, we find several species of Aphides described and mentioned as existing upon pines, but none on *Pinus australis*, nor will any of the descriptions agree with the species under consideration. It belongs to the section *Lachnini* as defined by

Thomas, and we therefore propose for it the name of *Lachnus australi*, and submit the following description:

LACHNUS AUSTRALI, n. sp.

Wingless ♀: Length .08 to .16 of an inch. Uniform light brown; head small, eyes large and round, bulging out on each side; beak extremely long and slender, reaching to last ventral segment; antennæ six-jointed, reaching to hinder part of thorax; joints 1 and 2 bead-like; 3rd longest, widest at apex; thorax twice as wide at hinder part as head; abdomen very broad, wider than long, with numerous black spots on top, arranged in transverse rows; nectaries black, tuberculous, nearly obsolete; legs very long, setaceous and black, excepting basal third of tibiæ, which are yellowish.

Winged individual ♂: Blackish, length .08 to .10 of an inch; ala. expanse about .35 of an inch. Head black, punctate, outer margin pale yellowish; prothorax dark brown or blackish, greenish yellow along suture next the head; antennæ short, reaching below middle of thorax; mesothorax is beautifully marked with pruinose bands, starting from each corner of scutellum, which is transverse and pruinose; they curve inwards and meet on top of mesothorax, forming one band which runs straight forwards, dividing again obliquely into two bands to juncture with prothorax; two dots of pruinose on either side of this band; wings hyaline, front pair with a very long, thick stigma, with the third vein remarkably thin and three-branched; hind wings with two oblique veins; abdomen with a dorsal row of whitish or pruinose spots on 5 abdominal segments, also along each side, and 12 brownish subdorsal round spots; under surface uniformly pruinose; legs black, excepting tibiæ, which are partly yellowish; beak long, reaching to last ventral segment, pale in color to near the tip, which is black.

ENEMIES.

We have bred from this species three ichneumon flies, two belonging to the Aphididæ family and one to the Chalcididæ, which we shall describe in a future paper.

ENTOMOLOGY FOR BEGINNERS.

THE LEGGED MAPLE BORER—Aegeria acerni (Clemens).

BY THE EDITOR.

In 1860 Dr. Clemens described this pretty moth in the Proceedings of the Academy of Natural Sciences, Philadelphia, and since then it has been written on by Mr. P. Gennadius in the *American Naturalist* for January, 1874, and in the same year by C. V. Riley, in his 6th Missouri Report. It is well figured in the accompanying cut, figure 6 (after Riley), in all its stages; *a* shows the larva, *b* the cocoons exposed by removal of the bark, *c* the moth, and *d* the chrysalis.

Fig. 6.

The moth appears late in May and during June. When the wings are expanded it measures about three-quarters of an inch across; its wings are transparent, decorated with bluish-black markings. The head and palpi are of a deep reddish-orange, antennae bluish-black, thorax ochreous-yellow, abdomen bluish-black varied with ochreous-yellow and terminated by a tuft of brilliant reddish-orange hairs.

The under side of the body is ochreous-yellow with bluish-black markings.

The female deposits her eggs on the bark of the soft and sugar maple trees, chiefly on the former, and when hatched the young larvae burrow through the bark and feed upon the inner portion and sap wood, never penetrating into the solid heart wood. The excavations made by the larva are filled with its brown castings. When full grown it is more than half an inch long, cylindrical to the eleventh segment, then tapering to the end, with the skin wrinkled and folded. The head is small, of a yellow color, cervical shield paler; stigmata brown; legs and tips of prolegs reddish. When the larva is full grown it eats its way nearly through the

bark, leaving but a very thin layer unbroken; it then retires within its burrow, and having enclosed itself within a loose, silky cocoon, changes to a brown chrysalis. A short time before the moth escapes the chrysalis wriggles itself forward, and pushing itself against the thin papery-like layer of bark, ruptures it and the chrysalis protrudes as shown in the figure. Soon afterwards the imprisoned moth in its struggles ruptures the chrysalis and escapes.

This insect appears to be increasing in numbers every year, and is very destructive, especially to young maple trees. Many of our shade trees in London are much injured by it, and where very numerous it is liable to completely girdle the tree and kill it. It is also found throughout the Middle States. To prevent the moths from laying their eggs the trunks of the trees should be painted about the first of June with a mixture of soft soap and lye about the thickness of paint, or with a mixture of lime and soap. When once the larvae obtain an entrance it is very difficult to discover them, and they will then carry on their destructive work all through the summer.

PTEROPHORIDÆ.

BY CHARLES FISH, OLD TOWN, MAINE.

About three years ago I commenced the study of the "feather-wings," with the intention of preparing at some future time a monograph of the North American species of this family. While adhering to my original intention, I have decided to so far modify it as to publish in advance certain new species which have accumulated on my hands, and I am induced to this course the more because it may be a considerable time before sufficient material will have been obtained to justify me in publishing my general paper. In the meantime I wish to obtain as many examples of this family as possible from all parts of North America, and any aid that may be given me by collectors I shall try to reciprocate. I prefer to have the examples pinned, but not spread, and great care should be observed in pinning, that the wings be not denuded or the legs broken off. The upper surface of the wings should never be touched with the fingers, nor should the specimens be allowed to roll about in the cyanide bottle and become denuded in this way. The very excellent directions

given by Prof. Fernald in CAN. ENT., Vol. x., No. 5, for the collection of *Tortricidæ*, will apply equally well to the *Pterophoridæ*.

I desire to express my obligation to Prof. Fernald, who first suggested to me the idea of making a special study of this group, and who has granted me the free use of his valuable private library, and greatly aided me in other ways. I am also much indebted to Prof. P. C. Zeller and Lord Walsingham for aid in determination of species and advice during the prosecution of my studies of this group. To the entomologists and collectors who have assisted me in procuring material I likewise desire to render my thanks. To Mr. Henry Edwards in particular I am under obligation for the loan of his entire private collection in this family, comprising many beautiful species, mostly obtained in California and Oregon.

PLATYPTILUS ALBICANS, n. s.

♀. Head, thorax and palpi cream color. Frontal tuft very short and blunt. Palpi ascending, extending beyond frontal tuft. Antennæ pubescent, banded above with alternate black and white scales, dark brown beneath. Abdomen pale ochreous, cream color at base. Anterior and middle femora and tibiæ cinnamon brown, sprinkled with whitish scales exteriorly, pale cream color interiorly; tarsi dark cinereous, first two joints whitish interiorly. Posterior tibiæ cream color, brownish just before the spurs; tarsi cinereous, whitish at base of joints.

Fore wings cleft one-fourth, creamy white along the inner margin, along the costa broadly cinnamon brown sprinkled with white. Costal triangular patch not sharply defined, cinnamon brown, bordered posteriorly above the fissure by a rather broad white line, but below the fissure its apex is continuous with the brown color of the lower lobe. Both lobes cinnamon brown, more or less sprinkled with white atoms, with a broad white transverse line which does not reach the inner margin of second lobe. Costal cilia concolorous with adjacent portion of wing, white just before the apex, a few brown hairs at the apex. Cilia of fissure white, behind transverse line brown. Cilia of posterior margin whitish, at posterior angle of each lobe brown. Cilia of inner margin whitish. Hind wings cinnamon brown, with concolorous cilia. Third lobe very narrow, linear; cilia pale at base, bearing no dark scales. Underneath, fore wings cinnamon brown, with white transverse line sharply reproduced, also white line at base of first lobe, reaching from costa half-way to base of fissure. First and second lobes of hind wings cinnamon brown, the first

lobe with a very broad oblique white line near the apex. Third lobe creamy white, somewhat dusted with brown along inner margin on apical half. Alar expanse, 22 mil. Nevada, H. K. Morrison.

Platyptilus Edwardsii, n. s.

Head, thorax and abdomen ochreous brown. Frontal tuft short and blunt, brown above, whitish beneath. Palpi ascending, extending beyond the frontal tuft, brown above, whitish beneath. Antennæ finely ciliated, obscurely banded above with alternate white and blackish scales, beneath cinereous. Abdomen slender. Legs ochreous brown; hind tibiæ and all the tarsi rather pale.

Fore wings cleft one-fourth. Color reddish ochreous brown, darker on the costa, with a faint sprinkling of whitish scales. Triangular costal patch blackish brown, bordered posteriorly by whitish scales. A small brown patch near the inner margin at the basal fourth, and another near the costa at the basal third; a white transverse line at apical third of the lobes. First lobe before transverse line very dark on the costa, and with a longitudinal dark patch midway between costa and inner margin; second lobe dark at the anal angle. Costal cilia white just behind triangular costal patch and near apex; between, very dark brown. Cilia of fissure white to transverse line, beyond dark brown; on posterior margin white outwardly, brown on basal half, with a marginal line of darker scales at base; at posterior angle wholly brown; on inner margin whitish, with a small patch of dark scales before, and one just behind apex of costal triangle.

Hind wings reddish brown, third lobe with ochreous tinge on inner edge. Cilia brown, with a dark division line at end of first and second lobes. Third lobe linear; cilia of inner margin whitish at base, and bearing a small patch of dark scales just before apex.

Under side of fore wings cinereous brown, ochreous towards apex; transverse line distinct, also white spot on costa behind triangle; triangular patch showing faintly. First lobe of hind wings ochreous, with oblique white line near apex; second lobe cinereous; third lobe with ochreous and white scales mingled.

Alar expanse, ♂ 25–27 mil., ♀ 22–23 mil. Described from 2 ♂ and 3 ♀ taken at Boston, Mass., by Mr. Hy. Edwards, to whom the species is respectfully dedicated; and 5 ♂ and 1 ♀ taken at Amherst, Mass., by Mr. L. W. Goodell.

ŒDEMATOPHORUS GRATIOSUS, n. s.

Head and palpi rather dark brown, scarcely lighter between antennæ. Antennæ pale brownish, dotted above with white and dark brown scales. Thorax brown gray, anterior portion lighter. Abdomen fawn brown; scales somewhat raised at extremity of segments. Legs grayish brown, spurs concolorous, not tipped with darker color, tarsi pale cinereous, slightly browned at extremities of joints. Middle band of middle tibiæ inconspicuous, consisting of a few raised scales on one side.

Fore wings pale cinereous with dark brown dusting; an oblique brown patch before base of fissure; faint indication of a brown median spot; a longitudinal brown costal spot nearly opposite base of fissure. Cilia concolorous. Hind wings and cilia brownish cinereous, third lobe whitish. Under side of wings dusky cinereous. Alar expanse, 22 mil. California, Mr. Hy. Edwards.

ŒDEMATOPHORUS CINERACEUS, n. s.

Front of head and palpi dark brownish gray, neck dark brown, vertex of head and thorax pale cinereous. Palpi stout, turned upward, third joint very short. Antennæ brownish cinereous, dotted above with dark brown. Abdomen brownish cinereous, somewhat marked with dark brown scales. Legs brownish cinereous dusted on one side more or less with dark brown scales; middle and end band of middle tibiae dark brownish gray; spurs all tipped with dark brown; tarsi whitish cinereous, very slightly browned at extremities of joints.

Fore wings pale cinereous, tinged with brownish, and very thinly dusted with dark brown atoms. These brown scales form a very small median spot, and a somewhat larger one before the base of fissure, bordered posteriorly by whitish. There is a longitudinal brown costal spot opposite base of fissure, two smaller ones towards the apex, and one on inner margin of anterior lobe just before apex. Basal two-thirds of costa only along the very margin dark brown gray. Cilia brownish cinereous. Hind wings and cilia brownish cinereous, darker than fore wings. Under side of wings dark brownish cinereous. Alar expanse, 28 mil. Washington Territory, H. K. Morrison.

ŒDEMATOPHORUS BARONI, n. s.

Front of head and palpi rather dark brown, lighter on the vertex. Palpi rather stout, third joint very short and blunt. Antennae pale

cinereous, obscurely dotted above on basal portion with dark brown. Thorax and abdomen pale brownish cinereous, the latter marked dorsally by a row of fine black dots, one at the extremity of each segment beyond the third; a few black scales also on the lateral portions. Anterior and middle femora pale brownish cinereous, tibiæ gray, tarsi whitish cinereous. Posterior femora and tibiæ pale brownish cinereous, tarsi whitish; spurs very short, tipped with black.

Fore wings brownish cinereous, with a decidedly ochreous tinge on the inner margin and posterior lobe, the whole surface being thinly dusted with fine black atoms. No other markings. Cilia concolorous with adjacent surface. Hind wings and cilia, as well as under side of wings, dark cinereous.

Alar expanse, 30 mil. California, O. T. Baron, to whom the species is respectfully dedicated.

NEW CYNIPIDAE.

BY H. F. BASSETT, WATERBURY, CT.

(Continued from Page 57.)

CYNIPS Q. POMIFORMIS, n. sp.

Globular, polythalamous galls, sessile on the twigs of *Quercus Agrifolia*, much resembling small round apples except that the apex is not depressed as is usually the case in this fruit. Size from one to two inches in diameter. Color various shades of brown, depending upon the degree of exposure to the sun. The smoothish surface sometimes with a few small, hard, scattered wart-like points. In the larger specimens there are faint lines reaching from the base to the apex, as though it were divided internally by septa; but no such divisions are found. The interior is a rather dense mass of yellowish brown cellular tissue, in which, near the base, lie closely imbedded the thin walled larval cells.

I received these galls last summer from my brother, H. D. Bassett, of San Francisco, Cal. The exact locality where found was not mentioned. The flies began to appear the first of March. They are all females, and judging from the appearance of the galls they seem to belong to the dimorphic class whose cycle of change is completed in one year.

Gall-fly: Head black, vertex coarsely wrinkled. Ocelli large, black and shining. Antennæ 14-jointed, only two-thirds as long as the body; 1st joint stout, club-shaped; 2nd short, ovate, almost globular; 3rd a little longer than the two preceding taken together; 4th equal to the 1st and 2nd together; 5th to 10th gradually shorter, 11th to 14th very short, sub-equal. Color, clear dark yellowish brown, changing to dusky brown towards the tips. Face black, with fine hairs, broad, but vertically quite narrow. Mandibles black, palpi clear dark shining brown. Thorax black, coarsely rugose, the rugæ crossing and nearly obliterating the parapsidal grooves. These, as far as traceable, are as follows: Two short parallel lines from the collare, one-third the distance to the scutellum; two lines from the collare to the scutellum, closely convergent on the latter. A short, *smooth* line or *ridge* over the base of each wing. Scutellum small, wrinkled; fovae small, indistinct. The entire thorax and legs with fine microscopic hairs. Legs light shining brown, posterior pair much darker. Wings slightly dusky. Veins slender, except the 1st and 2nd transverse, which are heavy, and the latter has a dark cloud at the base of the radial area. The longitudinal veins brown, becoming almost colorless towards the apex of the wings. Areolet small, in some specimens a minute translucent point. Radial area open. Abdomen shining black, 1st segment very long, with white hairs beneath the wings. The posterior edge of all the segments a clear shining brown. Ventral sheath same color. It is very small and the few hairs at and near the tip are microscopic.

Length, body .16, wing .16, antennæ .10. Des. from twenty living specimens in my collection.

CYNIPS Q. FICULA, n. sp.

Closely compressed clusters of monothalamous galls, sessile on and surrounding the young branches of *Q. macrocarpa*, forming globular and symmetrical masses sometimes two inches long and an inch and a half in diameter, but usually about one-half this size. The individual galls in these clusters assume a great variety of forms, by reason of the lateral pressure which they exert upon each other. The most common form resembles that of pressed figs, and this species bears a close resemblance to the much smaller one which Dr. Fitch named *C. q. ficus*, but which Mr. Walsh described as *C. q. forticornis*. The normal form would undoubtedly be that of a regular cone attached by its apex to the branch.

They are when young entirely covered with a rust colored pubescence which mostly disappears from the outward and exposed surface. This outer portion of the gall is somewhat wrinkled and of a dull reddish brown color. The interior is filled with a soft spongy reddish brown substance which is more dense towards the true base of the gall, and where lies the single larval cell. This cell is not separable from the spongy mass surrounding it. These galls were collected last fall in the northern part of Georgia by Mr. W. H. Patton, from whom I received them. They produce only female gall-flies, which I describe as follows :

Gall-fly : A very dark reddish brown throughout. The thorax and abdomen almost black. Head—Vertex finely punctate and with a few short yellowish hairs. Surface of the face entirely concealed by the dense covering of short and closely appressed hairs. Antennae a uniform dark reddish brown, 14-jointed ; 1st joint club-shaped, 2nd regularly ovate, 3rd one-fourth longer than the two preceding taken together, 4th equal in length to the 1st and 2nd together, 5th to 10th gradually shorter, 11th to 14th sub-equal. Surface of the entire thorax concealed by the fine, dense, closely appressed hairiness. Parapsidal grooves—two parallel lines reaching half way from the collare to the scutellum, two slightly diverging lines reaching a little more than half way from the scutellum to the collare, and a smooth line over the base of each wing. Legs of a uniform clear dark reddish brown. Wings large, sub-hyaline, veins dark brown, very distinct but rather slender. Cubitus very slender and disappearing altogether just before reaching the first transverse. Areolet small but well defined. Radial area open, the longitudinal vein bounding its inner edge considerably curved. Abdomen rather small, highly polished and shining, 1st segment with a tuft of yellowish white hairs beneath the wings. Sheath of the ovipositor (in *dry* specimens) projecting beyond the abdomen and covered with coarse yellowish hairs.

Length, body .13, wing .18, antennae .11.

Cynips Q. mammula, n. sp.

Galls : Hard woody knots at the base of the young shoots on thrifty young white oak trees, *Q. alba.* They affect both the lateral and terminal branches, and as they are of a hemispherical form, and of large size when compared with the branch which always grows out of their summit, they suggest the name above given. They are polythalamous, and the larval cells are arranged as though the eggs had been deposited around the bud

before the leaves appeared. The white, thin-walled larval cells are imbedded in woody tissue from which it is almost impossible to detach them. The galls formed around the lateral buds are from one-half to three-fourths of an inch in diameter, but those around the cluster of terminal buds are often an inch in diameter, and instead of a single branch, several are often found growing out of a single gall. They do not seem to affect the growth of the branches the first year, but must seriously injure the tree the following year when the perforated galls begin to decay. This species was very common last year in a thicket which I have searched for galls every season for the last fifteen years without discovering it. The flies are of both sexes and they leave the galls in July.

The flies, of which I have many thousands, may be described as follows :

Female : Head clear yellowish brown ; the vertex when highly magnified shows a finely crackled surface. Eyes and ocelli black, the latter very near together. Face rounded and full, with a few short hairs scattered over it, and a brush of long bristly hairs on the mentum. Tips of the mandibles show a faint duskiness. Antennæ 13-jointed, 1st joint club-shaped, abruptly truncate ; 2nd small, regularly ovate ; 3rd and 4th slender, 3rd a trifle shorter than the two preceding taken together, 4th equals the 1st in length. The first four joints are of a uniform clear yellowish brown, while the remaining ones are of a dull dusky brown ; the transition from one shade to the other is abrupt, and not gradual as in most species. The remaining joints are also considerably larger than the third and fourth, and are short and sub-equal, except the last, which is one and a half times the length of the preceding. Thorax dark brown, semi-translucent, the scutellum and post-scutellum almost black. Mesothorax smooth and shining, but highly magnified it appears very finely rugose. Parapsidal grooves absent, scutellum darker and more strongly rugose than the mesothorax. Fovæ wanting. Two anterior pair of legs pale yellowish brown, posterior pair much darker. Wings hyaline. The 1st and 2nd transverse and the subcostal veins rather heavy, and a dark smoky brown. The cubitus disappears about midway between the two transverse veins. Abdomen smooth and shining and apparently black. The first segment one-third longer than the very long second segment, remaining segments short.

Length, body .09, wing .09, antennæ .06.

Male : Entire body a few shades darker than the female. The legs a

shade lighter. Antennæ 15-jointed, 3rd joint incised. The antennae are much longer than in the female, and the first four joints darker and the remaining ones a little lighter, and the transition less abrupt than in that sex. Abdomen small. The first segment twice as long as the second.

Length (dry specimens), body .07, wing .07, antennae .08.

CYNIPS Q. UTRICULA, n. sp.

Globular, monothalamous galls on the petioles and leaves of *Quercus alba*. Thin-walled, .15 of an inch in diameter, green or purplish, pubescent. Sometimes entirely preventing the development of the leaf, and appearing on the end of the short petiole. Sometimes found on the end of a vein in a partially developed leaf, and more rarely surrounded by the lamina of the leaf. In the last case it appears on both sides of the leaf, but is most prominent above. It contains no larval cell. In size and in structure it resembles *C. q. vesicula* found on the same oak, but it is several weeks later and the insects differ materially.

The flies appear early in June, and are of both sexes.

Female: Head black, very finely wrinkled, face sparsely covered with short stiff hairs. Antennae 13-jointed; 1st short, club-shaped; 2nd globular, 3rd long and straight, 4th three-fourths as long as the 3rd; 5th and succeeding ones, except the terminal one, one-half as long as the 3rd; 13th long and with an indistinct suture in the middle. Color clear yellowish brown at the base, gradually changing to dull deep brown at the tip. Thorax black. Mesothorax finely rugose. Parapsidal lines distinct, and a broad, deep median line from the collare to the scutellum. Line over the base of each wing present but indistinct. Scutellum coarsely wrinkled, sparsely hairy. Fovae connate, deep, smooth and shining at the bottom. Legs, two anterior pairs yellowish brown, except the trochanter, which is nearly black. Posterior pair darker brown.

Abdomen black, shining. Sheath of the ovipositor with short hairs at the tip. It turns upward and extends above the dorsum as in *C. q. operator*. Wings hyaline. The subcostal and the 1st and 2nd transverse veins shining brown, rather heavy, the others quite pale. The cubitus does not reach quite to the 1st transverse.

Areolet very small, and in some cases wanting. Radial area open. Surface of the wing more hairy than is usual among the Cynipidae. Length (dry) .10.

Male: Black, except the legs and the antennae, which are a little darker than the female. Antennae much longer than the female, 15-

jointed, *3rd joint not incised.* Abdomen small, slender, shining. First segment equal in length to all the others. Length (dry) .08.

This species is often quite abundant in the limited space where I have found it. In describing the galls I should have added that the larva is not enclosed in a larval cell.

Habitat—Conn.

LIMENITIS EROS VERSUS VAR. FLORIDENSIS.

BY THEODORE L. MEAD, NEW YORK.

Among the generally accepted canons of nomenclature is the rule that if a description includes two or more species, it shall be valid for neither as against subsequent authors who discriminate the forms properly.

While all of us may not be willing to push this rule to its limit and reject the first name altogether, it certainly is a wholesome restriction against a custom which has prevailed in some quarters, notably in France, of making loose and indefinite descriptions, waiting until some more careful writer has separated one of the forms as distinct and named it, and then declaring that the latter was the species really intended by the indefinite description. thus at one stroke of the pen creating a synonym and finding a new species to be named.

It seems to me that Mr. Strecker's reclamation as to *Limenitis* var. *Floridensis* and *L. Eros*, on page 29, is of this nature.

He speaks of his Limenitis as "the form found in the extreme south." Now there is a darker form of *Lim. Misippus* at the south—some specimens from West Virginia show a darker color than those from the Catskills; in Texas and even in Southern Illinois specimens are found of a deep mahogany color. This is the "southern form" of *Misippus* which differs notably from *Eros* in the absence of the white band on under side, to which the mention of v. *Floridensis* does not allude. This mention, it seems to me, is too brief and indefinite to rank as a description, especially as the names have now been fixed by careful descriptions and the *status* of *Eros* established as a distinct species.

The New York Entomological Club has a committee whose duty it is to consider cases of disputed nomenclature; their decision, when ratified, of course carries only the weight due to the unanimous opinion of the entomologists composing the Club. But this is a gain over the unorganized

expression of individual opinion, and it seems to me that this example might very profitably be followed by other similar societies.

I am authorized to state that this committee unanimously sustain the name of *Eros* Edw. as applied to the dark species, and *Floridensis* Streck. as applying to the dark variety of *L. Misippus* which ranges from Illinois to Florida.

CORRESPONDENCE.

ON THE USE OF THE FORCEPS OF FORFICULA.

I just happen to hit upon Dr. J. G. Morris's article on the functions of the forceps of Forficula (Can. Entom. 1877, p. 218), and it reminds me of a statement on the same subject in E. Newman's "Zoologist," 1850, p. 2,695, which however differs in its details, and deserves therefore to be reproduced here. The article is signed: John Williams, Royal Astronomical Society, Somerset House; the insect was *Labia minor*, and the principal passage runs thus: "Upon arriving at the highest point it "could attain (on a book upon which it had alighted) the insect stood "quite still and raised the elytra; it then, with a very quick motion, thrust "the point of one of the caudal appendages, close to the body, under the "wing, which was unfolded by its agency; this being repeated on the "other side, both wings were fully expanded and the insect briskly flew "away, etc." According to Mr. Morris, the insect *lifted up the short elytra with his forceps, before the wings would expand.* Both passages may perhaps be reconciled, only the former is more explicit in the statement that it is *the wing* which requires the help of the forceps in expanding.

C. R. Osten Sacken, Heidelberg, Germany.

The determination of *Alaus* published by Mr. J. T. Bell, on p. 59 of your last issue (xiii., No. 3) as *gorgops* is perhaps erroneous. I know that species (the older name of which is *lusciosus* Hope, v. Crotch List, Suppl. 27) from no locality north of the western part of Louisiana and Texas. The Canadian form *must* be *A. oculatus.*

In this connection, I would observe that a determination unless as authentic as possible, is liable to produce serious error if published as a contribution to a faunal list. J. L. LeConte.

Philadelphia, March 28th, 1881.

The Canadian Entomologist.

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DESCRIPTION OF THE PREPARATORY STAGES OF APATURA FLORA, Edw.

BY W. H. EDWARDS, COALBURGH, W. VA.

Egg.—Similar to egg of *Clyton*: nearly spherical, flattened at base, marked by 18 or 20 slightly prominent vertical ribs, and by many fine equi-distant striæ; color yellow-green. Duration of this stage 6 to 7 days.

Young Larva.—Length .8 inch; cylindrical, tapering from segment 3; pubescent; color pale green, translucent; head twice as broad as next segment, sub-globose, bilobed, the surface thickly pitted with shallow excavations; color shining yellow or ochrey-brown. Towards the last of the stage the body is less tapering, each segment well rounded; down middle of dorsum from 2 to 13 a dark green line, and another on upper part of each side, the dorsal area between these side lines whitish-green; below the lines more decidedly green; legs and feet green. To first moult 6 days.

After 1st Moult.—Length .14 inch; body a little thickest at 7, tapering slightly either way, the last segment ending in a forked tail; the surface closely covered with yellow and yellow-white tubercles, arranged in longitudinal rows, and also in regular cross rows; these tubercles are stout at base, subconic at top, of irregular sizes, and at top of each is a short white appendage; on middle of dorsum a dark green stripe, and another, but narrower, on upper part of side; the dorsum is covered by two bands of tubercles, divided by the green stripe, each band made up of two rows, the outer row being whitish, the inner yellow; below the lateral stripe is another band of two rows, and as the stage proceeds these separate, showing a dull green line between them, the lower row running with the basal ridge of body; the tails are divergent from base, are short, tapering, rough with tubercles, and these gave out longer hairs than elsewhere; under side, feet and legs yellow-green; head subquadrate, the sides rounded, the front a little rounded, the top incurved; whole surface

shallowly pitted and covered with a short yellow down ; color greenish-white, with dark brown spots and patches ; a large brown triangle over mandibles, a small sub-triangular patch at top in the depression, a sub-crescent patch along base of each vertex, and a stripe from vertex half way down side, another down the back ; the ocelli black on brown ground ; on each vertex a short, compressed, fleshy, white process, and single white spurs along back of head at top and down sides ; on the sides and tops of the processes and spurs many long white hairs. To next moult 4 days.

After 2nd Moult.—Length .26 inch ; similar shape, stouter, the sides somewhat less rounded than dorsum, the base broadest ; the tails more produced ; the tubercles as at next previous stage, white and yellow, but broader and flattened ; the two rows of each dorsal band a little separated so as to show a dull green imperfect line ; the side stripe much widened ; segment 2 wholly yellow ; head shaped as before, the depression more angular, green behind, green with dark brown patches at sides and front ; these patches much extended, the one at top nearly meeting by a triangular projection the triangle from mandibles, and the one from base of process in nearly all cases protracted to outer end of mandibles, so that the white in front is confined to two curved vertical stripes forming with a cross line between the two triangles the letter H, each upright, incurved ; the processes stout, short, cylindrical, evenly forked at top, each fork bluntly rounded, and a little tapering ; at the base is a spur turned forwards, and along the back and sides are single spurs ; color of process black in front, green behind ; along back of head at top spurs in line, and so down the sides, diminishing gradually in length, the upper ones bent down ; all as well as the processes pilose. To next moult 3 days.

After 3rd Moult.—Length .38 to .4 inch ; stouter, the back more arched ; marked as before ; head almost precisely as before. To next (last) moult 5 days.

After 4th Moult.—Length .6 inch, greatest breadth .14 inch ; same shape as at close of last stage and banded in same way, viz., a narrow dark green medio-dorsal stripe ; a broad upper lateral yellow-green stripe, a lower lateral one of same color ; the tuberculated bands on dorsum each divided by a medium yellow-green stripe, not so clear or uninterrupted as the others ; the inner row of each band is quite narrow and is yellow, the outer row is wider and white ; below the upper lateral stripe

is a yellow row, and a yellow and wavy one runs along the ridge, at base; these two side bands unite at 4 or 3 and go to head as one broad band.

Six days after 4th moult the larva reached maturity, and two days later suspended.

Mature Larva.—Length 1.2 ♂, 1.4 ♀; greatest breadth .18 ♂, .2 ♀; body sub-cylindrical, obese, in some cases almost same thickness from 2 to 8, then tapering rapidly to end, in others the middle segment is thickest and the taper is regular either way, 2 being of equal diameter with 12; the dorsum well rounded, the sides much less convex, rather flattened, and sloping to a broad base; the last segment ending in a forked tail; banded with tubercles as immediately after the moult, but these have constantly diminished in size as the larva progressed, and in no place are so distinct, and many have disappeared altogether; general color either bright yellow or ochre yellow, a little whitened along the edges of dorsal area; the medio-dorsal stripe is very narrow and either black or deep blue, but greenish on two or three anterior segments; the two side stripes are dull or sordid green, as is also the under side; feet and legs same; head .06 inch broad, .07 high, sub-quadrate, the sides rounded, the front moderately rounded, the top depressed at a slight angle; on each vertex a short, stout stag-horn process, with two equal prongs at top, one in front at base, another near the base on the front inner side, making four prongs which are of same shape, tapering to a blunt rounded top, and these and the entire front and sides of the process are black; the back is green, and upon it and at the sides below are four green similar prongs; along the back of head, at top and down the sides are several greenish-white slender spurs, the upper ones long, those on sides diminishing in length as they descend, and bent down; on the front four small knobs, two below horns towards the suture, two at side; the back of head green, the rest greenish-white and black, and thickly covered with a fine yellow down; the processes and spurs much covered with quite long white hairs; the entire surface of head shallowly pitted; in nearly all cases the pattern of face is as in the preceding stages, the top being black, and projecting over front and sides black sub-triangular or long patches; and also a black triangle resting on the black patch which covers the mandibles; the white area being restricted to four vertical stripes, two of them incurved on middle front, making the letter H, the uprights reaching from vertices to ends of mandibles, a narrow space between the two front triangles making a cross

bar; the other two being on the sides; but in many cases the white is much restricted on the front, there being merely two short bars on lower face; one example differed from all the rest, the face being largely white, the black tip and patches merely indicated by gray of the palest shade, the only black being in a small spot over mandibles; in all cases the mandibles and ocelli are black.

Chrysalis.—Length .7 ♂, .85 ♀; compressed laterally, the outline of ventral side convex, a regular curve from top of head case to end of wing cases; the abdomen prominent dorsally, much arched, sharply carinated, the sides very little convex and near the keel slightly incurved; the anterior edge of each segment on the keel a little produced and thickened, and marked on either side here by a shining black dot; the thoracic segments depressed at an angle of about 45° above the end of the keel, and their sides excavated; mesonotum low, rounded at summit, with a slight carina, the sides convex; the head case subconic, the ocellar projections prominent, three sided and running to a blunt point, the space between them on top of head being concave; from end of each a small ridge runs back, the two ridges meeting at base of mesonotum, the intervening area being almost flat, very little convex; color pale yellow-green, finely streaked and specked with light buff over head case, mesonotum and wing cases, and specked over abdomen; the neuration of the wings distinct in pale yellow or buff; a buff line passes along the keel and mesonotum, and forks to the projections of head case; another passes along the posterior edge of the wing case and is joined by a wavy line down side of abdomen; on middle of each abdominal segment on dorsal side is an oblique faint buff line pointing down and forwards, ending in a little buff spot. Duration of this stage 6 and 7 days.

In Butterflies of N. A., Vol. 2, Part 5, I described *A. Flora* as a "possible variety of *A. Clyton*," but expressed the opinion that it would be thereafter found to be a good species. The few examples then known to me were all collected by the son of the late Mr. Wm. Stadlmair, of Brooklyn, N. Y., at Pilatka, Fla., and were accompanied by undoubted *Clyton*. In 1880, I received from Dr. Wm. Wissfeld a female *Flora* taken at Indian River, and I urged him, in case he was so fortunate as to capture another female, to tie it in a bag over a branch of any species of Celtis tree. On 20th July, I received about 50 young larvæ, from eggs laid 11th July. A female had laid about 225 in a cluster within bag on

leaves of Celtis integerifolia, and on 12th, part of these were forwarded to me by mail in a tin box, arriving in good order, because the leaves had not lost their freshness, though 8 days on the road in the heat of July. I gave the larvæ Celtis occidentalis leaves, which they took to readily, and I had no difficulty in raising several of them to maturity. The first stage was about one half over when I received these larvæ, and four days afterward the first moult took place. The habits of the larvæ were similar to those of *Clyton*, during the early stages gathering in dense clusters and resting for long intervals, during the later stages separating and concealing themselves by stitching together two or three leaves. *Clyton*, in W. Va., unlike *A. Celtis*, has no second brood, and all the larvæ hybernate after passing the 2nd moult. In the spring they pass three additional moults, making five in all. *Flora* passed but four moults, like the summer generation of *A. Celtis*, and none of the larvæ hybernated. The butterflies began to emerge from chrysalis 22nd Aug., and continued doing so till 31st, by which time I had 4 ♂, 6 ♀. No examples of *Clyton* were at any time received last year from Indian River, and probably it does not inhabit that locality.

NOTES ON SCIOMYZIDAE WITH DESCRIPTIONS OF NEW SPECIES.

BY DR. L. T. DAY, NEW HAVEN, CONN.

Tetanocera clara Lw. Mass., Conn. Specimens of this species with typical frontal markings, have the posterior transverse vein nearly straight and perpendicular, as in *valida*. In a single specimen there is an incomplete brownish-black abdominal stripe, interrupted at the incisures.

Tet. pictipes Lw. Conn., Pa., Kansas, Wash. Ter. Specimens from Wash. Ter. are larger and more melanized than the New England species. Nearly the whole front is occupied by a blackish-brown quadrangular spot, leaving a yellowish border laterally and anteriorly.

Tet. combinata var. *sparsa* (Lw.) Mass., Conn., Pa. From the examination of a large number of specimens of both forms, chiefly collected by Dr. Williston, I am satisfied that *sparsa* can not be specifically

separated from *combinata*. In none of my specimens do I find the polished frontal stripe narrowed anteriorly, and yet in some the brown spots form very distinct double bands running across the wing. I find the antepenultimate band to run as frequently before as over the posterior transverse vein. Again, in those specimens with the double-band arrangement of the brown spots on the wings, I find the tibiæ in more than two-thirds not darker than the femora. In some of the specimens there is only a feeble attempt at double bands; even in single specimens I find both double and single bands, showing an unusual degree of variation for species of this genus.

TET. PUBESCENS, sp. nov. 1 ♂ ♀. Third joint of the antennæ shorter than the second, excised, bristle white pubescent, wings reticulated, with narrow costal border, posterior transverse vein but slightly curved and nearly perpendicular, tips of tarsi black. Long. corp. 7 mm. Long. al. 6.5 mm.

Yellowish-brown, somewhat tinged with reddish. Front yellow, with the middle stripe broad, excavated and polished, widening somewhat anteriorly; on each side near the orbit is a small black dot, and more anteriorly a second larger one between the antennæ and the anterior corner of the orbit. Antennæ reddish yellow, with the third joint shorter than the second, distinctly excised above and somewhat pointed; the second joint very broad, the upper border thickly studded with stout hairs, the under border with finer hairs. Antennal bristle slightly yellowish at the base and covered with a whitish pubescence. Face with white reflection and considerably receding. Dorsum of the thorax with two stripes dusted with white and bordered with brownish streaks, enclosing a rather narrow median yellowish stripe; lateral borders dusted with yellowish. Superior part of the pleuræ with a brownish-red longitudinal stripe extending to beneath the halteres. Scutellum somewhat lighter than the thorax. Abdomen yellowish-brown, with narrow brownish median stripe interrupted at the incisures. Legs yellowish; tarsi tipped with black. Surface of the wings yellowish, with the margin of the costal border black, extending from the stigma to the fourth longitudinal vein. There are five or six small clear spots on the anterior margin of the second longitudinal vein; the remainder of the reticulation similar to, but coarser and less distinct than in *saratogensis*, consisting of narrow longitudinal stripes bordered by small transverse spots, arranged for the greater part in pairs. The anterior transverse vein is near the middle of the discal cell;

the posterior transverse vein is slightly curved and almost perpendicular.

Hab. Washington Territory, H. K. Morrison. This species is most nearly related to *saratogensis*, but differs in the greater size of the second joint of the antennæ, and the long hairs or bristles above; the narrower costal border and sparser reticulation of the wings, and the blackened tips of the tarsi.

Tet. plebeja Lw. Specimens from Washington Territory agree closely with this common Eastern species. The median abdominal stripe is however more distinct, and there is a feeble indication of a double curvature in the posterior transverse vein.

Tet. plumosa Lw. The most common species of this genus in Connecticut. This species runs so closely to the preceding that it is sometimes extremely difficult to distinguish them. The posterior cross vein shows a considerable variation in its shape, as do the frontal markings.

TET. MONTANA sp. nov. ♀. Third joint of the antennæ obtuse, short, not distinctly excised, bristles plumose with black, wings greyish, unicolorous, posterior cross vein feebly bi-arcuated. Long. corp. 8.5 mm. Long. al. 7 mm.

Acorn colored. Front golden yellow, with a narrow distinct reddish median furrow, the black spot near the orbit wanting, but a reddish spot between the base of the antennæ and anterior corner of the orbit. Antennæ reddish-yellow, first two joints thickly covered with black hairs, third joint not longer than the second, and not distinctly excised above; bristle of the antennæ plumose with black. Face perceptibly lighter than the front, and by reflected light with a golden glisten. Occiput without distinct white spot. Thorax with a very distinct median, longitudinal stripe, bordered with a dusky line; also two narrow, less distinct, and interrupted stripes on each side; thorax covered with numerous short black hairs. Pleuræ distinct chestnut, and somewhat pollinose with gray. Abdomen unicolorous and thickly covered with black hairs; a narrow dark median stripe interrupted at the incisures; sides dusted with grey. Legs luteous; anterior femora darker than the middle and posterior, hind femora with a single long bristle on the under side in front; three last joints of anterior, two of middle and posterior tarsi black. Wings broad, not reticulated, of a uniform greyish or blackish tint; posterior transverse

vein very slightly bi-arcuated and sub-perpendicular; both transverse veins narrowly bordered with brownish-black.

Hab. Wyoming, June, Dr. Williston.

TET. LINEATA, sp. nov., ♀. Bristles of the antennæ nearly bare, wings not reticulated, posterior transverse vein very strongly doubly curved, so that the middle half is parallel to the fourth longitudinal vein. Long. corp. 6 mm. Long. al. 5 mm.

Pale brownish. Front obscure yellowish, with the median polished stripe tapering anteriorly; on each side near the orbit is a small reddish spot, and more anteriorly, between the base of the antennæ and anterior corner of the orbit, a larger reddish spot with a dark centre. Antennæ nearly the color of the front, the second joint covered with small black hairs, the third joint as long as second, scarcely excised and obtuse; basal half of the bristle concolorous with the antennæ, terminal half slender, whitish, and microscopically pubescent. Face gently receding, light yellowish. Thorax with a median reddish-brown stripe extending over the scutellum, divided in its anterior part by a narrow whitish line; on each side a stripe dusted with white extending over the side of the scutellum; laterally on each side there is another irregular brownish-red stripe bordered by whitish in front of the wings. Pleuræ with brownish stripe, extending to beneath the poisers. Abdomen brown with paler lateral borders and narrow posterior margins of the segments. Legs obscurely yellowish-brown, hind femora with a number of short spine-like bristles underneath the distal halves; tarsi blackened towards their tips. Wings yellowish-hyaline, with irregular brownish clouds in the end of the submarginal, most of the first posterior and middle of discal cells; posterior margin of the wing greyish. Transverse veins clouded with brown, the posterior one strongly curved, its middle portion parallel to the fourth, and its terminal portions perpendicular to the fourth and fifth longitudinal veins.

Hab. Connecticut, Dr. Williston.

An easily recognizable species with characters approaching somewhat the genus *Sepedon*.

Sepedon fuscipennis LW. Specimens from Washington Territory cannot be distinguished from New England ones. In all, the lateral frontal spots are more commonly absent, and the tarsi may show but a faint degree of blackening in their ground color. Long. corp. 5.5–8 mm.

Dryomyza pallida, sp. nov. Polished, pale yellow, bristle of the antennæ slender, sparsely pubescent with black near the base, thorax striped, wings pubescent, hyaline, first longitudinal vein clothed with hairs. Long. corp. 8 mm. Long. al. 8 mm.

Pale yellow, shining. Front deeper yellow, opaque, with the short pubescence and bristles black. Antennæ incumbent, reddish; second joint short, third about twice as long as wide, oval; bristle slender, the distal end bare, the proximal sparsely pubescent with black. Thorax yellow, with two narrow median stripes of a brownish tinge; on each side and posteriorly there are about ten black bristles. Scutellum with four black bristles. Pleuræ with narrow distinct brownish lines extending from the root of the wings to the humeri; just below and in front of the tegulæ is a small oval black spot. Abdomen pallid, yellow, and darkened toward the tip, shining, covered with rather long, fine black hairs. Legs pale yellow, with black hairs; last two joints of all the tarsi black; tip of middle tibial, and first three joints of middle tarsi, with a short brush of golden pile. Wings pubescent, hyaline. The first longitudinal vein distinctly hairy, the third bare; posterior transverse vein straight and perpendicular; both transverse veins bordered with black, as is also more narrowly the termination of the fourth longitudinal.

Hab. Connecticut, May.

This species is easily distinguished from the other American species already described by the hairy first longitudinal vein.

My thanks are due to Dr. S. W. Williston for the examination of his excellent collections in this family.

ON A GIGANTIC CHALCID FLY INHABITING FLORIDA.

BY WM. H. ASHMEAD, JACKSONVILLE, FLORIDA.

In the spring of 1880, while collecting Coleoptera, I secured a ♀ of a large species of Chalcid belonging to the genus *Smicra*, which is apparently unknown to the scientific world.

The specimen was captured on an oak shrub, in close proximity to an empty *polyphemus* cocoon. Could it have hatched from it? This is not improbable, as Prof. C. V. Riley's *Smicra mariæ* was bred from this moth,

and other species of the genus are known to be parasitic upon the larvæ of our larger moths.

For want of a good scientific library of my own, and there being none in the State, I was unable to look up the species until recently, and as I fail to find any description that will agree with it, either in size, coloration, &c., I submit the following :

SMICRA GIGANTEA, n. sp.

♀. Length .43 of an inch.

Head, antennæ and thorax black, opaque. Head and thorax coarsely and strongly punctate, antennæ more finely punctate ; eyes greenish red ; collare somewhat bulging at sides, praescutum triangularly elongated posteriorly ; scutum rather large, bulging ; scutellum convex, rounded off posteriorly, punctate ; abdomen rather abruptly produced into a long sharp point, the thick globular basal portion being a shining brownish red ; basal half of segment next the peduncle longitudinally grooved, the grooves being deepest at base and shallowing off at middle of segment ; the pointed part of abdomen black or brownish black, a few short whitish hairs scattered promiscuously over abdomen ; wings hyaline fuscous, veins black ; anterior and middle coxæ brownish red ; femorae brownish black ; tibiae and feet lighter: posterior coxae and femorale brownish red, smooth and polished, coxae slightly punctate, the swollen femorale toothed beneath where tibiae rest when drawn up, the latter brownish black ; tarsi and feet reddish brown.

NORTH AMERICAN NOCTUIDAE IN THE ZUTRAEGE.— FOURTH AND FIFTH HUNDREDS.

BY A. R. GROTE.

Oria sanguinea, 9, fig. 613–614.

"Georgia." This species has been generally recognized. *Oria* is used for *maculosa* in the Verzeichniss, from which *sanguinea* is distinct structurally. I have referred the latter as the type of *Porrima* in the Check List, No. 664. The doubtful reference there to Fitch's *volupia* must be struck out.

Epizeuxis lubricalis, 19, figs. 665–666.

"Java." I have considered that the locality is erroneous and that this undoubtedly represents *Helia phealis* Guen., a common species throughout the U. S. and California.

Dyachrisia balluca, 22, fig. 681–682.

"Georgia." The figures are excellent representations of our not uncommon *Plusia balluca* from Canada and the Middle and Eastern States.

Trigonophora frugiperda, 22, figs. 683–684.

Geyer refers to Abbot and Smith as authority for the species. It is without doubt the *Laphygma frugiperda* of Gueneé, a common and destructive Southern and Western species re-described by Prof. Riley in the Missouri Reports as *Prodenéa autumnalis*.

Aedia limbolaris, 23, fig. 689–690.

"Georgia." I have taken this species about Buffalo, N. Y.

Antiblemma flavipunctalis, 25, fig. 701–702.

"Java." Also with *lubricalis*, from M. de Luxerre, and probably American. It represents a female allied to *Renia pastoralis* Grote, which seems to differ only from *Renia Belfragei*, a common species, in the yellow stigmata. I have two males colored more darkly than *pastoralis* and agreeing in this respect more nearly with Geyer's figure. I have labeled these *flavipunctalis* in my collection; but the distinctness of the three forms is not fully made out.

Autographa oxygramma, 37, fig. 769–770.

"Georgia." Gueneé refers this Southern species to *Plusia*, Noct. 2, 350.

Agriphila bistriaris, 38, fig. 775–776.

"North America." I believe this is *Doryodes acutaria* H.-S., and have so referred it Bull. U. S. Geol. Survey, 179, 1878.

Exarnis difflua, 9, figs. 821–822.

"Labrador." Staudinger refers this as a synonym of *exulis*, Cat. Eur., 100.

Clytie liburna, 40, fig. 963–964.

"North America." This is without doubt the species afterwards described by Gueneé as *Scolecocampa ligni*. The red-brown shading on the reniform is not so bright as Geyer figures it. I have made this identification in my List of the Noctuidæ of North America, p. 20.

Acolasia hinna, 41, fig. 971–972.

"Georgia." A ♀ specimen sent me through Mr. v. Meske from Texas (coll. Heiligbrodt) seems to belong to this species. It is less distinctly marked than the figure, else nearly resembles it.

Carl Geyer is to be regarded as authority for the species in these fourth and fifth Hundreds, concluding the work. The date of the first Hundred is 1818; of the second, 1823; third, 1825; fourth, 1832; fifth, 1837. The total number of figures is 1,000, each example being figured in two positions separately numbered; each Hundred contains two hundred figures.

NEW CYNIPIDAE.

BY H. F. BASSETT, WATERBURY, CT.

(Continued from Page 79.)

CYNIPS TENUICORNIS, n. sp.

Galls: Densely hairy hemispherical masses attached by a single small point to the upper or under surface of the leaves of an unknown species of oak found in Arizona. They are from one-half to three-fourths of an inch in diameter. One specimen in my collection is nearly globular, but all the others are hemispherical, the flat side lying close upon the surface of the leaf. The woolly hairs are of a dull russet color and entirely hide the polythalamous gall beneath. Denuded of the hairs the surface of the gall is uneven, and beneath the slight protuberances lie the larval cells. The shell or rind is brittle, and when dry crumbles easily. The inside is nearly filled by the small and extremely thin-walled larval cells. Between these there are a few thin fibrous plates or lamina with open spaces. A gall of average size contained fourteen larval cells.

Gall-flies: All females. Head black, vertex finely rugose or punctate. Ocelli rather large; the middle one lies in a smooth shallow groove which extends from the posterior margin of the vertex nearly to the base of the antennae, and is broader behind than before. Face microscopically wrinkled and hairy. Antennae 14-jointed, extremely slender or thread-like; 1st and 2nd joints short and comparatively stout. the 2nd nearly as

long as the 1st, both of a clear dark amber color. Color of the remaining joints dark brown; 3rd joint equal in length to the first two: 4th, 5th and 6th gradually shorter, the remaining ones sub-equal. All except the first two closely connate. Thorax black, finely and evenly crackled. Parapsidal grooves only two. These are sharply defined but remarkably narrow, and widely separated on the collare, but closely convergent on the scutellum. Scutellum more coarsely and less evenly crackled, but in other respects like the mesothorax, from which it is separated by an extremely fine line or groove. Fovae absent. There are on the scutellum, also on the mesothorax between the base of the wings, and on the head, a very few microscopic hairs. Legs clear dark amber or yellowish brown. Tarsi darker brown. Abdomen olive brown with paler transverse bands; 1st segment half broader than the 2nd, and with a few very fine hairs on the sides beneath the wings. All the segments, except a narrow border on the anterior edge of each, with an extremely fine punctation that gives to them when highly magnified the opaque effect seen in ground glass. Sheath of the ovipositor short with a minute tuft of hairs at the tip. Ventral valves extending to the extremity of the abdomen. These, with the sheath of the ovipositor, darker than the rest of the abdomen.

Wings hyaline, medium size. Veins small, dark brown, or black towards the base, lighter at the apex of the wing. Areolet medium size, bounded by equal veins, cubitus disappearing a short distance from the 1st transverse. Radial area open, long and narrow.

Length, body .11, wing .12, antennae .08.

Galls collected in the Mule Pass Mts. in Arizona, in Nov., 1879, by Prof. E. T. Cox.

Cynips bella, n. sp.

Galls: These belong to the class known as oak-apples. They are attached by a minute sessile point to the under side of the leaves of an oak found in Arizona often near the margin of the leaf, but more commonly on or near the mid-vein. They are perfectly round, and those that have escaped the attack of parasites are quite uniform in size, measuring from ¾ to ⅞ of an inch in diameter. Those stung by parasites are generally much smaller, and this species is so subject to their attacks that more than three-fourths are thus affected. The galls (when dry) are of various shades of brown, mostly smooth but not polished: a few specimens have a decidedly russet color and a rough surface. The shell very thin and

brittle. Each gall contains a single larval cell which is kept in a central position by fine, silky, radiating fibres that reach from it to the outside covering. Besides these fibres, there are others that are attached to the inner surface of the shell, but which are not attached to the larval cell. They are much finer than the others and resemble coarse wool. Except that these galls are smaller, and the internal structure more delicate, and the surface less smooth and polished, they might easily be taken for those found on *Quercus rubra*—*C. inanis.*

Gall-flies: All females. Head brownish black, very small, though transversely very broad. Vertex microscopically wrinkled. Eyes rather narrowly oval. Ocelli large, black and shining. Head and face covered with fine downy hairs. Antennæ short, slender, hairy, shining reddish brown, darker towards the tips, fourteen-jointed: 1st joint large, club-shaped or ovoid with the upper end truncate and hollowed to receive the globular 2nd joint; 3rd one-fourth longer than the first two taken together; 4th equal to the 1st and 2nd; 5th to the 9th gradually decreasing in length, 10th to 14th very short, scarcely longer than broad. Thorax covered with bright shining hairs. Parapsidal grooves: Two parallel lines extending from the collare three-fourths the distance to the scutellum. Two diverging lines reaching from the scutellum to the collare. These are much nearer together at their starting point on the scutellum than is usual in the genus *Cynips*. There is the usual short line over the base of each wing. (All the above markings of the mesothorax are found in most of our one-gendered species—not in all, however.) The posterior limit of the two parallel lines vanishes in a tuft of long hairs, which in common with the hairs on the thorax, converge into a ridge on each of the interlinear spaces. Scutellum small, but long in proportion to its breadth, slightly shagreened. Fovæ very shallow, confluent, smooth and shining. Legs dark shining, semi-translucent brown, with abundance of whitish hairs.

Wings large, surface covered with short, stout, nearly erect hairs, and *numerous dark opaque with lighter cloudy spots.* Veins dark shining brown and very heavy. Cubitus, as in *C. nubila*, is very broad and heavy at its union with the 1st transverse: 2nd transverse broad and heavy, particularly at the base of the radial area. Areolet not large, but clearly defined. The radial vein at its termination forms *a large triangular blotch with an indistinct areolet in the centre.* By the curvature of the radial vein and its considerable backward extension along the margin of the wing and the upward extension of the costal vein beyond the base of the radial area,

what may be termed a *half open* and perfectly radial area is formed. The anal vein is sometimes branched or forked at the tip.

Length—body .14, wing .16, antennæ .08. Des. from living specimens. Galls received from Prof. E. T. Cox, of Tucson, Arizona.

DIASTROPHUS SIMILIS, n. sp.

Galls on *Nepeta glechoma*, simple or compound; the simple ones are round and have a single cluster of larval cells in the centre; the compound are extremely irregular in form and size, and have two or more distinct clusters of cells. The round galls vary in size from ⅛ to ¾ of an inch in diameter, and contain from one to six and even more round larval cells. The cells in dry galls are held in place by coarse fibres that are attached to the cell and to the extremely thin and almost paper-like outside covering of the gall. From galls that lie on the ground through the winter the outside quite often entirely disappears, and the bleached fibres surrounding the larval cells look like little burrs. The galls grow on the leaves, petioles and occasionally on the stems of the plant. The plant is not common in this place, but wherever I have seen it the galls are also found. Very fine specimens have been sent to me from Long Island. This species does not seem to differ very much from *D. glechomæ* found in Europe, and may be identical. The plant is supposed to have been introduced from Europe, and with it the insect may have come, but such descriptions as I have found of *D. glechomæ* are not sufficiently full to enable me to decide as to their identity, and I have some very good reasons to believe them distinct.

Gall-fly: Head black, finely rugose on the vertex. Ocelli small, close together, and almost linear in position. Face rough, broadly carinate. Mandibles black. Antennæ long, slender, thirteen-jointed with faint traces of a suture in the last joint; 2nd one-half as long as the 1st; 3rd to the 12th inclusive of equal length; 13th one-third longer than the preceding. The head hairy on the posterior side. Thorax black and shining, but when highly magnified it presents a beautifully crackled surface. The two parapsidal grooves broad and smooth, narrowly convergent on the scutellum. Scutellum unevenly and roughly rugose. Fovæ large and deep, separated by a low smooth ridge. Legs of a uniform reddish brown, ungues black. There is on the middle of the posterior side of the posterior pair a rather dense tuft of hairs much longer than on the other legs and reminding one of the tufts found similarly situated on certain species of bees.

Wings hyaline; veins slender, pale yellowish brown. Areolet wanting.

and the thick dark spot at the confluence of the veins, which usually marks the obsolete areolet, also wanting. Cubitus very pale, and reaching only half way to the first transverse. Radial area open. Abdomen black, shining: 1st, 2nd and 3rd segments dorsally sub-equal, 1st with a minute round, dense tuft of hair on the sides beneath the wings. Sheath of the ovipositor not exserted, inconspicuous, a few minute hairs at the point.

Length—body .12, wing .15, antennæ .10.

Described from living insects cut from the galls, Oct. 23, 1879. The flies probably live in the galls over winter.

C. MINUTA, n. sp.

As soon as the leaves of *Quercus alba* begin to expand in the spring, a few buds are occasionally seen that develop into a cluster of greatly enlarged petioles without a leaf blade, or at most only a very rudimentary one. They are three or four times the size of those of a full grown leaf, and each contains a number of larvæ of the small gall insect which I have named *C. minuta*. The larvæ mature very rapidly and the imagos leave the gall about the time that the leaves are full grown. Occasionally an embryo leaf seems to have escaped the sting of the mother insect, and a fully developed leaf appears among the galls, but such instances are not common. The galls are pubescent and usually of a pinkish color. The insects are of both sexes, and may be described as follows:

Male: The entire body a clear semi-transparent amber, with a shade of brown on the thorax and the back of the abdomen. The eyes and ocelli a dull black, the latter much less prominent than in *C. vesicula*, n. sp. (next described). Antennæ 14-jointed, the first three joints pale amber, the remaining ones by a sudden transition a dusky brown; 1st joint club-shaped, 2nd oval, 3rd long and slender, curved, but only slightly incised; remaining ones short and of nearly equal length.

Thorax smooth and shining, but in certain lights the living specimens show bands of darker brown where the parapsidal grooves appear in other species. Scutellum small, smooth and shining. Fovæ wanting, but the furrow separating the mesothorax and scutellum broad and deep.

Wings with a slight smoky tinge, veins distinct. Cubitus reaching quite to the 1st transverse. Areolet of medium size. Radial area long and narrow, partially closed by the thickened border of the wing as in *C. vesicula*. Legs of a uniform pale amber, ungues dusky brown.

Abdomen petiolate, small, smooth, shining and tapering to a cone-like point at each extremity.

Length—body .08, wing .10, antennæ .07.

Female: Entire body except the antennæ and legs apparently black, but really a very dark brown. Antennæ 13-jointed, and as in the male, except that they are shorter and the 3rd joint is straight. First segment of the abdomen (petiole?) short, remaining ones taken together not longer than deep.

The color, the much smaller wings (only .08), the shorter antennæ and the very short petiole give to the female an appearance so distinct from that of the male that it is not easy to believe that they belong to the same species: but that they are the same is proved by their being often found *in coitu*, and indirectly by the fact that there are several other species in which the sexes differ in the same way, and to almost as great an extent as in this case.

Length—body .07, wing .08, antennæ .05. Not rare in this section.

Cynips vesicula, n. sp.

Gall a small, smooth, reddish brown vesicle developed from the centre of the buds of *Quercus alba*, surrounded at the base by the bud-scales. The color is sometimes a pale greenish brown. The walls of the gall are thin and the larva free, that is, having no larval cell. These galls are partially developed in the preceding autumn, and mature so rapidly in the spring that the insects emerge about the time the leaves of the oak begin to expand.

Gall fly—Male: Head small, black, vertex triangular, and nearly covered by the large and protruding ocelli which form an equilateral triangle. Eyes very large. Face narrow, almost linear, the breadth considerably less than half the width of one eye as seen from the front. Antennæ long, filiform, 15-jointed, 1st and 2nd joints short, globular, 3rd deeply incised, the remaining ones nearly equal in length, except the very short terminal joint; 1st joint nearly black at the base, the others yellowish brown, darker towards the tip of the antennæ. Thorax shining black with extremely fine microscopic reticulations; no grooves or lines. Scutellum; surface as the mesothorax. Fovæ shallow and indistinct. Wings very large, clear smoky brown. Veins dark and heavy, the 2nd transverse when the wings are closed on a line with the extremity of the abdomen. Cubitus heavy and reaching quite to the 1st transverse. Areolet distinct. Radial area long

and narrow, and apparently closed by the somewhat thickened border of the wing. This thickened border of the wing scarcely deserves to be called a vein. Legs: Coxæ and trochanters clear shining black, changing below to yellowish brown, which is the color of the remaining parts. Color of the posterior pair a little darker than the others, particularly near the body. Abdomen shining black, the first segment an extremely slender pedicel, which is slightly enlarged in the middle.

Length, body .12, wing .16, antennae .12.

Female: Head broader than in the male. Ocelli and eyes much less prominent, face twice as broad. Antennæ slender, pale brown at the base changing to dusky brown above. Some shades darker throughout than the male antennæ and only two-thirds as long; 14 joints. Thorax like the male except that there are two faint parapsidal depressions, hardly grooves. Wings smaller and shorter. Color and venation the same. Legs paler. Abdomen large, shining, black, not distinctly pedicilate. This appears early in April.

Length, body .13, wing .14, antennæ .08.

Cynips Pattoni, n. sp.

Galls, clusters of larval cells along the midvein of the leaves of *Quercus obtusiloba*, on the under side, and standing perpendicular to its surface. The cells are completely hidden in a short, dense brownish wool. The largest clusters often extend along the midvein more than half the length of the leaf. They are found on young trees, and usually on the leaves near the top of the stronger growing shoots. The insects live over winter in the galls. My specimens gathered in October were kept in a warm room and the insects came out in the February following. The galls resemble in their woolly covering those of *C. flocci* of Walsh, but the latter are round and the woolly hairs are longer, and the species is only found on *Quercus alba*. *C. Pattoni* was discovered in 1876 on West Rock, in New Haven, Conn., by Mr. W. H. Patton, from whom I have received several interesting species of gall insects, and to whom, in acknowledgment of my indebtedness, I dedicate this species.

Gall fly: Head reddish brown. Antennae 14-jointed, dusky brown. The last two joints indistinctly separated by a closely connected suture. Entire head and face covered with short white hairs. The tips of the mandibles black. Thorax very dark shining brown, that in certain positions appears quite black; surface finely and evenly reticulate. Par-

apsidal grooves closely convergent at the scutellum. Short line usually present over the base of each wing, in this species wanting. A few scattered hairs on the borders of the mesothorax, most abundant at the base of the wings. Scutellum rugose, hairy. Fovae large and shallow. Legs a uniform reddish brown except the darker tips of the tarsi. Wings hyaline, veins fine and slender, dark brown. Areolet medium size, cubitus very pale and sometimes quite disappearing before reaching the 1st transverse; radial area open, broad and rather abruptly terminated by the short curve of the radial vein. Abdomen shining blackish brown, lighter on the venter. A few hairs on the sides of the first segment beneath the wings. The ventral valve projects a little above the dorsum.

Length, body .08, wing .11, antennae .07.

Described from twenty-five specimens, all females. In my collection.

CYNIPS POLITA, n. sp.

Galls round, monothalamous, found abundantly in midsummer on both surfaces of the leaves of *Quercus obtusiloba*, at or near the summit of young and thrifty shoots, from one to fifteen or twenty on a single leaf. They are from one-fourth to three-fourths of an inch in diameter, and are when grown in the shade of a paler green than the leaf, but when exposed to the sun are red or brown. They are attached so slightly to the midvein and its branches that their removal leaves little if any trace. The shell is when dry extremely thin and brittle, and the single round larval cell is kept in a central position by fine radiating and branching fibres that extend to the outside shell.

These galls resemble, except in their mode of attachment to the leaf, those of *C. singularis* B., but the insects differ considerably. They are also somewhat like those of *C. inanis* Harris, but are many times smaller. The insects are fully mature in October, but remain in the galls over winter.

I received my specimens of this species from Mr. E. Potts, of Philadelphia, and from Mr. Thomas Annadown, of Glassboro, N. J., and Mr. P. H. Uhler informs me that they are very abundant in southern New Jersey and in some parts of Maryland.

The shining and finely polished thorax and abdomen suggest the specific name given to the insect.

Gall flies: All females. Head apparently black, but in a strong light it is seen to be a very dark reddish brown: cheeks a shade lighter than

the other parts. Vertex beautifully reticulate. Antennae black, 14-jointed, 1st joint club-shaped, 2nd short ovate, 3rd as long as the two first taken together, 4th one-fourth shorter than the 3rd, remaining joints except the last short, sub-equal, last a little longer than the 13th. Thorax black, smooth and shining. Parapsidal grooves two, deep and narrow; between them are two parallel depressions that reach from the collare two-thirds the distance to the scutellum, but so very slight are they that they can only be seen by means of the difference in the angles of reflection when they are placed in a strong light. There are a few scattered hairs on the thorax and the polished and mirror-like pleurae are bordered with short scattered white hairs. Scutellum finely wrinkled, rounded posteriorly and projecting over the metathorax. Fovae small, widely separated, shining. Legs a very dark reddish brown, a little lighter at the joints. Wings hyaline, veins moderately heavy. Cubitus pale and slender. Areolet small. Radial area open, short and broad by the curvature of the radial vein. Abdomen black and polished. Pedicel, which in most species is a short thin plate, is in this more than half as long as broad. First segment with a very few scattered hairs on the sides beneath the wings. Sheath of the ovipositor slightly projecting, and at the end it has a few long yellowish hairs.

Length, body .11, wing .14, antennæ .08.

Described from dry specimens in my collection.

CYNIPS RUGOSA, n. sp.

Round, hard galls, sessile, on the branches of *Quercus prinoides*. Size from ½ to ¾ of an inch in diameter. They are attached to the branch by a small point. The surface when green is smooth and often quite red on the side exposed to the sun. When fully ripe they have a shrunken and shrivelled surface and the color varies from an ashen hue to a dull brown. The free larval cell is surrounded by a yellowish brown cellular mass, too dense to be called spongy, which fills the entire gall. This species has been known to me for many years, but until lately I have considered it a variety of *C. globulus* Harris, but a careful study convinces me that it is a distinct species. *C. globulus* is only on the white oak and rarely more than one or two galls in a place, and has even when dry a smooth surface, while *C. rugosa* is often found in clusters of four or five and even more, so closely compressed that the galls are of an angular or cuneate form. The flies are all females and they mature and leave the

galls late in the fall, at least I have never been able to find them in the galls in winter.

Gall-fly: Head small, vertex wrinkled. Ocelli minute and very close together. Face with short hairs which are longest about the mouth. Antennæ dark brown, 14-jointed, 1st joint large, club-shaped; 2nd broader than long, 3rd longer than the first two taken together, 4th as long as the first two, the four next following gradually shorter, 9th and remaining ones short and of equal length. Thorax covered with short appressed yellowish white hairs, which nearly hide the punctate surface. Parapsidal grooves: two parallel lines that extend rather more than half way from the collare to the scutellum, and two, also parallel, that extend half way from the scutellum to the collare, and a short line over the base of each wing, all nearly parallel and equidistant. Legs dark reddish brown. Wings large, hyaline; veins blackish brown, quite distinct, the subcostal and 2nd transverse darkest. Areolet present, not large. Cubitus reaches only half way from the areolet to the 1st transverse. Veins enclosing the open radial area stop abruptly before reaching the margin of the wing. Abdomen black, shining; 1st segment (in dry specimens) equals in length all the rest, and is covered with short white hairs on the sides beneath the wings. Sheath of the ovipositor a dark yellowish brown.

Length, body .16, wing .18, antennæ .10.

Described from numerous specimens in my collection.

CYNIPS CICATRICULA, n. sp.

Polythalamous galls on the midvein of the leaves of *Quercus alba*, never more than one on a leaf, and situated sometimes at the base, but usually from one-fourth to one-half way from the base, rarely above the middle. They project one-third below and two-thirds above the surface of the leaf. On the under side of the leaf they are rounded and on the upper cone shaped. The gall is solid and somewhat fibrous, and in its shorter diameter measures about one-half inch and in the longer from five to seven-eights of an inch. The larval cells radiate in all directions from the centre of the gall and are quite numerous. There is at or near the summit of the cone a small scar or indentation which is always present and so characteristic as to suggest the name I have given to the species.

CYNIPS CAPSULA, n. sp.

Galls: Monothalamous, on slender pedicels on the margins of the

leaves of *Quercus bicolor*, rarely more than one on a leaf. The pedicels are from one-half to three-fourths of an inch long. The galls are three-eighths long and one-eighth of an inch in diameter, oval and resemble very closely the capsules of certain mosses. Surface rough, and with the pedicel finely pilose, or rather, pubescent. The pedicel is usually, but not invariably, the extension of a lateral leaf vein. The whole is of the color of the under side of the leaves of this species of oak. Most of the leaves which bear galls are fully developed, but a part are more or less imperfect and occasionally a gall is found on what is but the merest rudiment of a leaf.

The galls appear with the leaves and the insects come out early in June. This little gall is a true larval cell and its thin walls offer slight obstacle to the attacks of parasites.

The gall flies are of both sexes and are described as follows:

Female: Color a deep shining black, with the exception of the antennæ, legs and sheath of the ovipositor. Head and thorax microscopically punctate and sparsely dotted with extremely fine, short hairs. Parapsidal grooves: One pair converging as they approach the scutellum, and a slight groove over the base of the wings. The short parallel pair seen in many species near the dorsal line is in this species represented by a very slight depression on each side of the rather prominent dorsal ridge, but these last are so obscure as to easily escape notice. The scutellum wrinkled rather than punctate. Fovæ wanting. Antennæ short, 13-jointed, 1st and 2nd globose, 13th as long as the 11th and 12th together and with a connate suture. Color amber, inclining to brown. Legs: Coxæ, trochanter black or blackish brown, femur and tibia dark, clear shining brown, paler at the joints. Tarsi pale cinnamon brown. Ungues black. Wings hyaline, veins pale brown, fading in the smaller ones to hyaline. Areolet small, indistinct. Radial area short, broad, open.

Abdomen: 1st segment equal in length to all the others taken together. The sheath of the ovipositor dark translucent brown, not turned up at the extremity.

Length, body .10, wing .11, antennæ .06.

Male: The smaller size, darker and longer antennæ, darker legs, and the much smaller and laterally compressed abdomen distinguish the male from the female.

Length, body .07, wing .11, antennæ .08.

Described from dry specimens in my collection.

CYNIPS AFFINIS, n. sp.

Monothalamous, round. thin-walled galls in the buds of *Quercus prinoides*, usually partly hidden in the scales of the bud, but in some instances standing out round and free like a little blister on the twig, in size only large enough to hold the larva within, and in color dark brown with grayish spots, or wholly brown. These galls are half-grown in the autumn and develop so rapidly in the spring that the insects come out just as the leaves begin to expand.

I should have been disposed to consider this species a variety of *C. vesicula*, which, both in gall and in insect, it closely resembles, had not late discoveries shown that dimorphic species often in one generation closely resemble each other and in the next develop characters that fully establish their non-identity.

The gall insects are of both sexes and may be described as follows :

Female : Black. Head finely rugose. Ocelli prominent. Antennæ 14 joints on a protuberant base ; 1st joint short, truncated ; 2nd short, ovoid ; 3rd one-fourth longer than 1st and 2nd taken together, 4th equal to the first two, 5th to 10th gradually shorter, the remaining four subequal, the last small and pointed. Color clear yellowish brown in the basal half, changing to dusky brown toward the tip.

Mesothorax very finely and evenly punctate ; parapsidal grooves wanting. Scutellum small, punctate, separated from the mesothorax by a rather broad shining groove. Legs clear, shining, almost translucent brown, with a darker shade in the trochanter and upper half of the femur.

Wings smoky. Veins smoky brown. Subcostal and the two transverse much darker than the others. The areolet of medium size, and instead of the usual equilateral, in this species it is an isosceles triangle with the narrow base on the 2nd transverse vein. Cubitus slender but reaching quite to the 1st transverse. Radial area open, but the subcostal extends above the base a short distance, and the anterior border of the wing is somewhat thickened, which gives, in certain lights, the appearance of a closed radial area. Abdomen briefly petiolate, black and shining, so shrunken in the specimens before me as to render further description impossible.

Length, body .09, wings .11, antennæ .08.

Male : Antennæ 15-jointed, slender, long, 3rd joint deeply incised. Color of antennæ as that of female. Wings much larger. Legs paler

and the dark brown of femur wholly wanting. Abdomen with a long slender petiole, very small and black and shining throughout.

Length, body .11, wing .13, antennæ .11.

C. GEMULA, n. sp.

This species is a recent discovery of mine, having escaped detection on account of its early appearance and minute size. The gall is found in the centre of both the flowering and leaf buds of *Q. prinoides*. It is fully developed when the sterile flowers of this species of oak are in bloom. Only one gall is found in a single bud. It is exactly like an ordinary acorn in shape, having a truncate base and a cone-like extremity with a sharp point at the apex. It is a dull blackish color, and only .10 of an inch in length and .05 in diameter. It contains but one larva. When the gall happens to be in a leaf bud it is often found at the summit of a young branch one or two inches long, so rapid is the growth of the tree at this season. In the flower buds it is often nearly hidden in the surrounding bud scales. The insects appear in both sexes about the middle of May, and may be described as follows:

Female: Head black, finely rugose. Ocelli medium size, the anterior one forming the vertex of a more than ordinarily obtuse triangle. Antennæ 14 joints; 1st short, truncate; 2nd ovate and standing in the cup-shaped summit of the first like an egg in an egg cup; 3rd short, though a little longer than the first two taken together; 4th a very little shorter than the 3rd. Remaining ones sub-equal and of moderate length. In color the 1st and 2nd are a clear brownish-yellow, the rest a dull brown, growing darker in the terminal joints. Thorax bright shining black. Parapsidal grooves well defined; no other lines or grooves. Scutellum finely rugose. Fovæ wanting, but there is a smooth narrow groove between the mesothorax and the scutellum. Legs a clear, uniform amber, ungues black. Wings decidedly fuscous. Veins dark and well defined. Cubitus *heaviest in the lower half*. Areolet present, but very minute. Radial area open. Radial vein heavy its entire length and slightly thickened at the end, which does not quite reach the margin of the wing. Abdomen sub-pedicellate; 1st segment very long, shining black, remaining segments in dry specimens concealed in the first so completely as to make their study very difficult. Sheath of the ovipositor very small, with a few microscopic hairs on the dull yellowish brown tip.

Length—body .08, wing .11, antennæ .07.

Male: Antennæ 15 joints, the 1st and 2nd a little darker than in the

female, the 3rd slightly curved. Thorax narrow. Wings much larger than the females. Abdomen very small and much compressed laterally; in other respects not differing materially from the female.

Length—body .09, wing .14, antennæ .09.

This species is often found with *C. affinis*, but both gall and insect are quite different from that species.

C. PIGRA, n. sp.

The galls of this species answer perfectly to Baron Osten-Sacken's description of *C. q. tumifica*. They are large irregular swellings on the midrib of the leaves of *Q. tinctoria*, always on the under side and usually on the lower half of the leaf. Sometimes two distinct galls are found on the same leaf. Their presence is only indicated on the upper surface by a widening of the midrib and a slight depression of the leaf at that point. They are often an inch in length and in the middle half an inch in diameter, tapering more or less towards the ends. They are of a dense cellular tissue, with the woody fibre of the midrib along the axis. The cellular portion contains a large number of larval cells, which are inseparable from the enveloping substance.

Having discovered a young oak nearly all of whose leaves had these galls upon them early in June last year, I made frequent visits to it to watch the development of the larvæ. Quite sure that they would prove to be *Cynips q. tumifica*, I expected to find the insects fully matured early in July, but at that time the larvæ could scarcely be seen in the soft, immature vegetable cells that surrounded them, and it was late in autumn when the perfect insects made their appearance. This extremely slow development suggested the specific name. The gall flies are all females, and differ widely from *C. q. tumifica* O S.

Description: Head, thorax and abdomen deep black. Ocelli small, widely separated and inconspicuous in the rather coarsely rugose surface of the vertex. Antennæ 14-jointed; 1st joint short, club-shaped, 2nd ovate, 3rd not quite as long as the 1st and 2nd taken together; 4th, 5th and 6th each a little shorter than the one immediately preceding it. The remaining joints sub-equal and scarcely shorter than the 6th. Color at the base is a clear yellowish brown changing gradually to a light dusky brown at the end. Thorax finely and evenly punctate. A favorable light reveals two extremely faint, parallel lines that extend half way from the collare to the scutellum. They might more properly be called depressions, as they

do not interfere with the punctation. There is a very short but broad and smooth groove that begins at the scutellum on the middle of the mesothorax; it ends suddenly as a groove, but continues as a faint depression half way to the collare. The parapsidal grooves are fine and narrow, but distinct. There is a smooth polished line over the base of the wings. Scutellum rugose, round, small. Fovæ large and deep. Legs rather dark reddish brown. Wings large, hyaline, veins slender but sharply defined; areolet small, radial area open, cubitus extremely slender in the lower half and colorless throughout. Abdomen polished and shining, 1st segment long and more than equalling in length the remaining ones taken together. A few short scattered hairs on the anterior half beneath the wings. Sheath of the ovipositor very short, color at the tip dark yellowish brown, a few very short microscopic hairs at that point.

Length—body .11, wing .14, antennæ .08.

C. IGNOTA, n. sp.

Galls: Small oval cells, found singly or in small clusters of from two to eight together on the under side of the leaves of *Q. bicolor*. They are sessile on the midrib and principal veins, and usually lie in a position nearly horizontal to the surface of the leaf. They are at first covered with short woolly hairs, but when ripe become more or less denuded. The naked surface when examined with a microscope shows numerous minute papillæ, and between these a fine and regular reticulation. They are .10 of an inch in length and .05 in diameter, and might easily be mistaken for the cocoons of some species of *Microgaster*.

About fifteen years ago I found a few of these galls on the fallen leaves of a large oak and also on a small tree a few rods distant. The next year the greater part of the leaves on the large tree were covered with galls, a hundred or more being sometimes found on a single leaf. I gathered a large quantity after the leaves fell, and the flies came out the next spring. I have examined this tree every year since and have never found any of these galls, nor have I ever seen them on other trees.

There are some specimens of this species in the Museum at Cambridge, which Dr. Hagen informs me were found on oaks in the University grounds. I examined some oaks of the same species in the borders of the Botanical Garden at Cambridge last fall, and found several species of galls, but none of these. Can it be that the species has disappeared entirely?

The flies are all females.

Description : Head black, finely rugose. Ocelli small. Antennæ 13-jointed ; 1st and 2nd joints short, dusky yellowish brown, remaining ones changing gradually from dull dusky brown to dark opaque brown. Thorax microscopically crackled or striate, the striæ apparently transverse, though not so over the whole surface. Parapsidal grooves present, but not as strongly impressed as in most species ; no other lines. Scutellum finely rugose. Foveæ wanting. Legs clear yellowish brown, posterior pair much darker, especially the femur. Wings slightly dusky, veins pale slender. Areolet medium size, and bounded by almost transparent veins. Radial area open ; cubital vein very slender. Abdomen black ; 1st segment black and shining, in length equal to all the others taken together. Sheath of the ovipositor short, dusky yellowish brown at the tip.

Length—body .07, wing .10, antennæ .06.

C. PAPULA, n. sp.

Clusters of small papillose or cone-like galls on the upper side of the leaves of *Q. rubra* and *Q. tinctoria*, projecting unequally and usually so crowded as to form a confluent mass of pustule-like elevations. They are very hard, though only transformed portions of the blade of the leaf. On the under side of the leaf they appear simply as a scar, projecting little if at all. They bear a slight resemblance to the galls of *C. futilis*, but this species is rarely confluent and never beyond two or three galls, while *C. papula* is quite often found in clusters of forty or fifty, or even a hundred. *C. papula* is monothalamous, while *C. futilis* has, usually, from three to five larvæ in each gall.

I discovered this species many years ago on a red oak tree near my residence, but the galls were only seen on a single leaf. Soon after I found a leaf or two having these galls upon them—on the same species of oak, twenty miles south of this place (at Derby, Conn.) ; and still later found them in considerable numbers on the leaves of *Q. tinctoria*, at Chicopee, Mass. In this last locality I have observed them for several years, but always confined to a few trees in a very limited area.

This species *ought* to be found in both sexes, but among the few specimens in my collection I cannot discover any males.

Description : Head dark reddish brown. A few white hairs on the posterior edge of the vertex. Ocelli large. Vertex finely punctate. Antennæ brownish red, darker towards the extremity ; 13-jointed, the last three joints connately joined, and forming a rather heavy club, such as is

seen in many Braconides. Thorax black, lustreless, sparsely covered with very fine short hairs. Parapsidal grooves faint and indistinct, converging slightly as they approach the scutellum. A very faint median line, discernible on the posterior part of the mesothorax, extends one-third the distance to the collare. Surface of the entire thorax.

Fovæ present but indistinct. Legs reddish brown. Abdomen shining black. Sheath of the ovipositor yellowish. Ovipositor yellowish brown, and remarkable for its great length. In all my dry specimens it is exserted to a length at least five times that of the entire body, and is coiled two or three times.

Wings hyaline. Costal and first and second transverse veins fine clear reddish brown, the others fine and nearly colorless. Cubitus extremely faint, and quite disappearing before reaching the first transverse. Areolet small and elongated, and in some specimens wanting. Radial area open.

Length—body .08, wing .07, antennæ .04.

C. NOXIOSA, n. sp.

Galls : Large, woody, polythalamous, terminal or sub-terminal swellings on the twigs of *Q. bicolor*, varying greatly in size and form, but usually tuber-like and three or four times as long as thick. The larger specimens in my collection are nearly an inch in diameter and four inches long, and contain a large number of insects. The smallest are almost imperceptible swellings, and have often but a single insect. These galls develope in the summer, and the insects, which are all females, live in the galls over winter, coming out before the leaves appear in the spring. They resemble, both gall and gall-fly, *C. batata B.*, and I for a long time, considered them a variety of that species. Some new facts in the history of *C. batata B.* having been learned, I shall re-describe it in these articles, when the differences between the two species will be stated. *C. noxiosa* is described as follows :

Head black, finely and regularly punctate. Antennæ 13-jointed ; 1st dark, nearly black ; 2nd and 3rd brownish yellow, the remaining ones gradually changing to dark dusky brown. Thorax smooth, but under a one-eighth lens showing a beautifully fine crackled surface. Parapsides entirely wanting. Surface of the scutellum like the meso-thorax, though the markings are a trifle coarser. Fovæ wanting. Legs dark shining brown, with clear yellowish brown joints. Tarsi dark yellowish brown.

Wings hyaline. Veins almost black, all clear and distinct. Areolet small but very sharply defined. Cubitus unusually heavy its entire length. Radial area open, the veins enclosing it strong and dark quite to the edge of the wings. Abdomen smooth, shining black, much shrunken and distorted in the dry specimens, and the long ovipositor much exserted.

Length—body .08, wing .09, antennæ .06.

These galls are invariably preceded by a vernal crop, which affects the leaves only, and which may be described as follows: Gall, an enormous development of the mid-vein of the leaf, often to the extent of an inch in diameter and an inch and a half in length. Green, smooth, but irregular in shape, and succulent and a little harder than a green grape. The blade of the leaf dwarfed and curled, and after the galls mature drying up. In some years these galls are so abundant on certain trees as to affect nearly all the vernal leaves, but a later crop hides the blighted appearance they produce. They are filled with larval cells, from which are produced vast numbers of male and female gall flies, about the twentieth of June. Long observation has satisfied me that this is the bisexual generation of *C. noxiosa*. The females of this brood agree exactly with the above species, except in size and in the length of the antennæ, they being a little smaller.

Length—body .07, wing .08, antennæ .04.

The males, which are nearly or quite as abundant as the females, differ from them as follows: Color throughout somewhat paler. Body longer. Antennæ 14-jointed, 3rd joint curved but not incised. Legs clear yellowish brown. Abdomen small, petiolate; petiole slender.

Length—body .09, wing .08, antennæ .05.

Large numbers of both generations in my collection.

Cynips corrugis, n. sp.

This species is founded on a single specimen which I took from the claws of a small spider that had evidently just killed it. The spider was in a cluster of the sterile flowers of *Quercus prinoides*. The capture was made on the 11th of May. This species is remarkable for the almost diaphanous wing veins, the pedicellate abdomen, and the coarsely corrugated sculpturing of the thorax. It is a female, and may have been in the act of ovipositing in the young acorns or the buds of this oak when killed by the spider. The description is as follows:

Head clear dark reddish brown, finely and evenly rugose. Ocelli dark brown, not *black*, as is usually the case among the Cynipidæ. Antennæ 14-jointed, clear translucent brown, except the four or five terminal joints, which are darker and more opaque. Mandibles black and shining, and contrasting beautifully with the clear light brown of the face. Thorax clear, translucent brown, somewhat darker than the head, coarsely rugose and corrugated; even the parapsidal grooves have a wrinkled surface, and are in certain lights scarcely distinguishable from the general surface. Scutellum like the meso-thorax, but small and ending abruptly posteriorly and perpendicularly to the axis of the body. Foveæ wanting. Wings and wing veins, except the subcostal and 2nd transverse, perfectly hyaline; these last have a very faint brownish tinge. Areolet wanting. Radial area open. Legs clear dark, somewhat paler at the joints. Tarsi pale brown; ungues nearly black. Abdomen petiolate; 1st segment clear brown at the base, changing to shining black posteriorly; in length equal to one-half the entire abdomen; remaining segments of an opaque brownish black, and with a fine microscopic punctation. Venter and the sheath of the ovipositor clear shining brown, the sheath without hairs and only moderately exserted.

Length—body .11, wing .12, antennæ .06.

C. CINEROSA, n. sp.

Globular, monothalamous galls, from three-fourths to one inch in diameter, the surface in recent specimens covered with a mealy grayish powder, which disappears when the galls have been long exposed to the weather; internally of a dense cellular structure, much like the galls of *C. q. globulus*; the rather large, centrally placed larval cell nearly or quite free. These galls, and the gall flies produced from them, were collected in Texas, and were sent to me by Mr. Wm. Saunders, of London, Ontario, who received them from Prof. J. M. Maisch, of Philadelphia. I have been unable to learn from what species of oak they came.

The flies, which are all females (20 specimens), may be described as follows: Head small, covered throughout with short appressed hairs. Tips of the mandibles shining black. Color of the head, thorax and legs, a dull yellowish brown. Antennæ 14-jointed; short, hairy, dusky brown, except that the first joint on the inner side, and the second and third at the tips, are a paler brown and shining.

Thorax: two parallel lines extend from the collare half way to the

scutellum. The space between these is darker than outside. There is a short median line starting on the posterior edge and soon disappearing, and two rapidly diverging lines from the same border, which extend half way to the collare. Outside of these are two parallel lines of the same length. All these are some shades darker than the general surface.

Scutellum small, and hairy like the meso-thorax. Fovæ wanting. Abdomen clear shining reddish brown, except the posterior edges of the segments, which are nearly black; 1st segment, except a small spot on the dorsum, covered with fine short hairs; sheath of the ovipositor very large and with strong white hairs; ovipositor shining black, and slightly exserted in dry specimens. *Ungues* black. Wings sub-hyaline, veins dark brown; second transverse heavy. Areolet distinct but small. Cubitus slender, and disappearing before reaching the 1st transverse. Radial vein heavy, and ending in an enlarged point within the border of the wing; radial area open. Length of a specimen of average size, .18.

This species is probably the agamous generation of what will yet be found in another generatien and in another form of gall, two-gendered. The galls and insects sent me vary so much in size that I strongly suspect they may represent two very closely related species, but the slight differences between the large and small flies hardly warrant me in separating them till I can learn more of their habits. My description refers to the *largest* specimens.

C. FLOCCOSA, n. sp.

The late, terminal leaves of the thrifty shoots of young oaks of the species *Q. bicolor* are often thickly dotted on the under side with small hairy, or rather woolly, galls, sometimes as many as two hundred being found on a single leaf. The leaves are sometimes quite small, and in such instances the galls become nearly or quite confluent. They measure, including their woolly covering, about .15 of an inch across, but divested of this, only .05 or .06, and each contains but a single larva. The larva is free, having no larval cell. The galls are hemispherical, and attached by their flat side to the leaf, and they show on the upper surface only as small, smooth, flat, shining blisters. They are so much infested by inquilines and other parasites that all attempts to rear true gall flies from them proved fruitless for many years. I, at length, succeeded in rearing in the spring a considerable number of true gall flies from galls collected the October preceding in Northern Ohio. Only females have

yet been reared, and these minute creatures will be found, no doubt, like other and larger ones that live over winter in the galls, to be only of one sex. The description is as follows:

Head, thorax and abdomen shining black and smooth. Ocelli large, but not conspicuous. Antennæ 13-jointed; 1st and 2nd joints comparatively stout, the 3rd a little longer than the two preceding ones taken together, very slender; the remaining ones also slender, but slightly increasing in thickness towards the last; color, a pale, dusky yellowish brown. Thorax without lines or grooves of any kind, anteriorly high and rounded. Scutellum very small. Foveæ obsolete. Legs dark brown, except the joints and the tarsi, which are almost colorless. The wings rather large. Areolet large. Radial area long, narrow and open. The cubitus is very slender, and disappears at some distance from the 1st transverse. The vein bounding the areolet on the posterior side is so nearly colorless at that point that the areolet itself might easily be pronounced wanting.

Abdomen smooth and shining; the terminal segments, in dry specimens, are almost entirely retracted into the rather large 1st segment; the abdomen is sub-petiolate.

Length—body between .04 and .05, wing .06, antennæ .03.

C. Coxii, n. sp.

Galls: Hard, smooth, woody knots or swellings on the twigs of *Quercus, sp.* They are covered with bark not unlike the rest of the twig. The two specimens in my collection are not more than three-fourths of an inch in diameter, but whether of average size or not I am unable to say They might easily be taken for small specimens of *C. Suttonii, B*, from California, or for *C. batatoides*, Ashmead, an unpublished species from the live oaks of Florida, but the insects differ specifically from both these.

My specimens were received from Prof. E. T. Cox, who collected them near Tucson, Arizona, probably from one of the dwarf live oaks of that region. I have reared from them only female gall flies, which are described as follows:

Head deep yellowish brown; vertex very slightly punctate. Ocelli small, black. Antennæ near together, 14-jointed; 1st joint short club-shaped, 2nd short ovate; these two, in a favorable light, are an almost golden yellow; 3rd one-third longer, and the 4th a little shorter than the 1st and 2nd taken together; the 5th, 6th and 7th short, and the remain-

ing ones very short, and all of them of a dull opaque brown ; at the base of the antennæ, on the lower side, is a nearly black spot, its edges fading into the prevailing color. The face is hairy ; the mentum smooth, but with a fringe of long stiff hairs on the lower edge. The mandibles are dark, nearly black. The color of the thorax differs considerably in different individuals ; in some it is quite black, but in most is more or less clouded with spots of clear shining yellowish brown. The pleurae are black in all my specimens. The parapsidal grooves are large and deep. They start quite near together on the scutellum, and diverge gradually till within a short distance of the collare, when they diverge so suddenly as to form a rather short curve in that part of their course. Scutellum small, finely rugose and hairy, separated from the mesothorax by a broad, smooth band, that can hardly be called a furrow or fovae. Legs clear yellowish brown. Ungues very dark, but not black. Wings hyaline, quite large. Veins rather slender, pale reddish brown. Areolet small. Radial area open, and, by the curvature of the radial vein, broadest in the middle. Abdomen shining black ; 1st segment rather large, and with a few short hairs scattered over its anterior half, mostly confined to the sides beneath the wings, remaining segments short and withdrawn (in dry specimens) within the first ; sheath of the ovipositor straight, with moderately long hairs towards the point.

Length—Body .11, antennae .06, wings .14.

Described from dry specimens.

[Note.—When my description of the gall of *C. cicatricula* was already in type, I found my specimens of the gall flies were quite unfit for description, and the species will be described in a future paper. In answer to some of my friends, who have expressed some surprise that I still retain for all the oak gall insects the old generic name *Cynips*, I will say that I intend to publish a complete list of our described species, with their true generic names, in the course of the summer. In this I shall follow Dr. Mayr's classification, adding to his list of American galls such new species as I have not already submitted to him. In my illustrated monograph, on which I am at work, I shall give brief descriptions of all the American species known to me.]

CORRESPONDENCE.

ANTIGASTER VS. EUPELMUS.

DEAR SIR,—

I have read with interest Mr. Howard's remarks on p. 31, *ff.* In the article in the *American Entomologist* which he refers to, I stated distinctly that he gives reasons for considering *Antigaster* and *Eupelmus* synonymous, and, as I consider the reasons good, I have no criticism to make thereon. My remarks were intended to show rather that his reflection on Walsh that there were "no grounds for the founding of the genus *Antigaster*" was hardly justified. I endeavored to show that with the light then at his command Walsh had reasons for erecting the genus. The characters of *Eupelmus* as set forth by Mr. Howard are mostly brought together from works subsequent to Walsh's characterization of *Antigaster*. The close relationship of this last with *Eupelmus* was recognized by me as previously stated by Mr. Howard, and whether, in the light of subsequent writings, the two should be combined generically is a question depending on the limitation or comprehensiveness we deem best to give to generic divisions, on which subject I have no reason for differing from my friend who, from special study of the family, is most competent to decide.

C. V. RILEY, Washington, D. C.

HOW WE CAPTURED A HORNET'S NEST.

DEAR SIR,—

One fine day last October, while enjoying a ramble in the woods near Belleville, with two of my sons, one of them took hold of a knot which projected from a small half-decayed log, intending to turn it over to search for beetles beneath it. The piece, however, came away in his hand and disclosed the entrance of a nest of black hornets. Of course we retreated "at the double" before the disturbed insects recovered from their first surprise, leaving them to settle down at their leisure. A few days after, taking advantage of a cool morning, I sent my two boys to the wood with a small bottle of chloroform and a hard rubber syringe. According to directions, they injected about a drachm of the liquid into the hole, and threw a handkerchief over the entrance. In about five minutes they opened up the nest, when they found the inmates in a perfect state of slumber, and transferred them without trouble to their cyanide bottles. In about an hour they returned, bringing me forty-eight specimens of the insect

J. T. BELL.

THE COLORADO BEETLE.

DEAR SIR,—

The following extract from an English newspaper, the *Bristol Mercury*, will show how carefully the Colorado Beetle is looked after in England and how great a risk he runs if he sets foot within the United Kingdom. He is far more sternly outlawed than was Robin Hood or Smith O'Brien, and if only a suspicion of his presence is felt, all, from the Privy Council downwards, are up in arms to crush him with all the terror of the law. Let us hope they will succeed in making the country too hot for even the ten-lined Spearman.

"Mr. Borlase put a question as to the discovery of a Colorado Beetle in South Devon.

"Mr. Mundella answered, saying the Colorado Beetle was in his department (a laugh). He then gave the facts of the discovery of a live Colorado Beetle in the possession of a man at Yealmpton, who refused to give it up. Upon instructions from the department he was prosecuted under the Destructive Insects Act of 1877, and fined the mitigated penalty of £5, he pleading ignorance of the law and agreeing to the destruction of the beetle." E. W. C.

DEAR SIR,—

I always look for the coming of the CAN. ENT. with pleasure. Having seen several articles in the ENTOMOLOGIST relative to the abundance or scarcity of insects, as compared with past seasons, I would inform you that in 1879 I did not see a single specimen of *Terias nicippe*, while this year they were abundant, in fact more numerous than *Colias philodice*.

Columbus, O., Dec. 2, 1880. W. N. TALLANT.

DEAR SIR,—

On the 6th Oct., 1880, I took six *cresphontes* larvæ feeding on prickly ash. Some of them fed for several days afterwards, and in due time they all transformed to chrysalids. Now they have all emerged as butterflies; the first appeared on the 22nd of March, the last on the 17th of April, 1881. They measure from 3¾ to 4½ inches in expanse of wing, perfect in form and rich in coloring. J. ALSTON MOFFAT.

Hamilton, April, 1881.

DEAR SIR,—

In your last issue Dr. LeConte pronounces my record of the capture here of *Alaus gorgops* to be "probably erroneous," because he has not known any instance of that insect having been taken north of Texas and Western Louisiana, and that therefore my specimen *must* be *Alaus oculatus*.

Alaus oculatus is of such common occurrence here that I have long ceased to collect specimens, unless remarkable for beauty or for abnormal size, either large or small, and with over twenty years' acquaintance I ought to be tolerably familiar with its appearance and proportions. The specimen in dispute was found resting on a stump in Bleecker's Woods, about half a mile from our city limits, and was taken by me as an unusually fine and large example of *Alaus oculatus*, and placed as such among my seasonal captures; but on placing it in my cabinet I observed so marked and manifest a difference between it and the other specimens, that I thought it might be a distinct species. Finding from Crotch's List that there were only three species known, and possessing examples of two of them, I obtained a specimen of *A. gorgops* from Mr. E. P. Austin, of Boston, for the sake of comparison, which came to hand ticketed "Dallas, Texas." On placing this side by side with mine, I was unable to distinguish the slightest shade of difference except that mine is rather the larger and fresher specimen. In order to show the identity of these two examples, and their common difference from *A. oculatus*, I append their respective measurements as taken at the time, and carefully repeated and verified, as also the dimensions of my largest specimen of *A. oculatus:*

	Mr. Austin's sp'n.	My own.	*A. oculatus.*
Total length,	41 mm. (about 1⅔ in.)	42 mm.	42½ mm.
Length of thorax,	12 mm. (sharp.)	12 mm. (full.)	12½ "
Breadth of thorax,	11½ mm.	12 mm.	11 "
Breadth of elytra,	11½ mm. (full.)	12½ "	11½ "

The ocular spots on the thorax are much larger and more circular in shape than those of *A. oculatus*, and the white marginal lines are much broader and more distinctly marked, in all which characters Mr. Austin's specimen and mine thoroughly agree. I am thus led to the conclusion that either my specimen is *Alaus gorgops*, or that Mr. Austin's *is not.*

I have in my collection examples of *A. oculatus* varying in length from 42½ mm. to 25 mm.

JAMES T. BELL.

Belleville, April 29th, 1881.

The Canadian Entomologist.

VOL. XIII. LONDON, ONT., JUNE, 1881. No. 6

ENTOMOLOGY FOR BEGINNERS.

BY THE EDITOR.

THE EYED ELATER—Alaus oculatus.

This is the largest of our Elaters or "spring beetles," and is found with its larva in the decaying wood of old apple and other trees. The beetle, fig. 7, is about an inch and a half—sometimes more—in length, of a black color, sprinkled with numerous whitish dots. On the thorax there are two large velvety black eye-like spots, from which has arisen the common name of the insect. The thorax is about one-third the length of the body and is powdered with whitish; the wing cases are ridged with longitudinal lines, and the under side of the body and legs thickly powdered with white. It is found in the perfect state in June and July; is active in the daytime, flying about with a loud buzzing noise.

Fig. 7.

The mature larva, which attains its full growth early in April, is about two and a half inches long, nearly four-tenths of an inch across about the middle, tapering slightly towards each extremity. The head is broad, brownish and rough above, the jaws very strong, curved and pointed, the terminal segment of the body blackish, roughened with small pointed tubercles, with a deep semi-circular notch at the end, armed at the sides with small teeth, the two hindermost of which are long, forked and curved upwards like hooks. Under this hinder segment is a large fleshy foot, armed behind with little claws, and around the sides with short spines; it has six true legs, a pair under each of the first three segments. Early in spring the larva casts its skin and becomes a chrysalis, and in due time emerges a perfect beetle.

This beetle, when placed upon its back on a flat surface, has the power of springing suddenly into the air, and while moving, turning its

body, thus recovering its natural position; this unusual movement, together with its curious prominent eye-like spots, combine to make it a constant source of wonder and interest. Since it feeds only on decaying wood, it scarcely deserves to be classed with destructive insects.

THE STAG BEETLE—Lucanus dama.

This is another very common beetle somewhat similar in its habits to the eyed Elater, but very different in appearance. It is a large and powerful insect belonging to the family called Lamellicornes, or leaf-horned beetles, from the leaf-like joints composing their antennæ. In the male, fig. 8, the upper jaws or mandibles are largely developed, curved like a sickle and furnished internally beyond the middle with a small tooth; those of the female are much shorter and also toothed. The body measures from an inch to an inch and a quarter in length, exclusive of the jaws, and is of a dull mahogany brown color. The head of the male is broad and smooth, that of the female narrow and roughened with punctures. The insect appears during the months of July and August, is very vigorous on the wing, flying with a loud buzzing sound during the evening, when it frequently enters houses to the alarm of nervous occupants. It is perhaps scarcely necessary to remark that it is not in any way venemous, and it never attempts to bite without provocation.

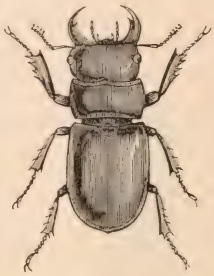

Fig. 8.

The female lays her eggs in the crevices of the bark of trees, especially near the roots. The larvæ live in decaying wood and are found in the trunks and roots of various kinds of trees, particularly those of old apple trees; they are also found in old cherry trees, willows and oaks. They are said to be six years in completing their growth, living all the time on the wood of the tree, reducing it to a coarse powder resembling sawdust. The mature larva is a large, thick, nearly cylindrical whitish worm, with a horny-looking head of a reddish brown color, dark mandibles and reddish legs. The body is curved when at rest, the hinder segments being brought towards the head.

When the larva has attained full size it remains in its burrow and encloses itself in an oval cocoon formed of fragments of wood and bark,

cemented together with a glue-like secretion, and within this enclosure it is transformed to a chrysalis of a yellowish white color. Through the partially transparent membrane the limbs of the future beetle are dimly seen, and in due time the beetle bursts its filmy enclosure and emerges to the light of day.

As this insect affects only old and decaying trees, it seldom does much harm. The use of alkaline washes, applied to the bark of the trees in July, would probably deter these beetles, in common with others, from depositing their eggs on the trees thus coated, and any mischief they might otherwise do be in this manner prevented.

DESCRIPTION OF THE PREPARATORY STAGES OF PAPILIO PALAMEDES, Drury. (*Calchas*, Fab.)

BY W. H. EDWARDS, COALBURGH, W. VA.

Egg—Spherical, a little flattened at base; color greenish-yellow. Duration of this stage four to five days.

Young Larva—Length .1 inch; near the end of the stage .28 inch, and then cylindrical, greatly thickened from 3 to 6; after 6, tapering to 12, then thickening to end, the back and sides after 6 a little incurved; 2 has a thin square ridge and on each curve of same a thick fleshy process, longer than others on body, thickly beset with straight hairs; there are two rows of similar processes, sub-dorsal, smallest on the narrow segments, colored as the segment they stand on, those on 12 and 13 considerably larger than any others except on 2; besides the subdorsal rows, are two dorsal, running the whole length of body, and one row on side, another along base; all these are small, simple tuberculations with hair on end; color of body brown-yellow marked with white; a white band, not very clearly defined, especially on its lower edge, passes along the side of segments 3 to 8, turning up on 8 to edge of dorsum, the two extremities there not quite meeting; 12 and 13 are white; under side greenish-brown; feet and legs same; head obovoid, a little depressed at top, smooth, shining, color yellow-brown, a shade darker than body. To 1st moult about 4 days.

After 1st Moult—Length .33 inch; same general shape, at first the

dorsum on the thickened segments is smooth and rounded, but after a few hours becomes flattened a little, and corrugated ; 2 has a thin, high, square topped ridge, the corners produced, and each bears a short thick process, pilose ; on 12 are two short subconical processes, on 13 two like them but larger, and these four form part of the two subdorsal rows, which are almost suppressed on 6 to 10, but are distinct on 11 ; the two dorsal rows of tubercles are minute ; color of body yellow-brown, darkest on posterior half, the anterior segments a little red-tinted ; the white lateral band as before, but distinct, white ; the dorsum and upper part of the side of 12 and 13 and a little of 11 pure white, the lower part of side less pure, the shield sordid white ; over the white band, on 4, is a large sub-oval black ocellus in a narrow yellow ring ; this ocellus is mostly occupied by a prominent rounded black process with many short black hairs on it ; head sub-cordate, finely granulated, shining yellow-brown, with fine hairs. To next moult 2 days.

After 2nd Moult—Length .36 inch ; same shape, and as before, the dorsal area on thickened segments becomes corrugated and flattened and depressed some hours after the moult, and the depression is enclosed by an elevated oval rim ; 3 is a little excavated on dorsum on anterior part ; 2 is a square-topped ridge, but the processes have passed away ; on 12 and 13 the processes as at previous stage, but the rest of the subdorsal rows have disappeared, and in place of part of them are slight rounded elevations, like those of the dorsal rows ; so that on 3 there are two dorsal and two subdorsal rows of these knobs, but two dorsal only on 4, 5, 6 ; on 9 and 10 are two subdorsal little round lilaceous spots ; color yellow-brown to dark brown, the anterior parts having most yellow ; the sides of the posterior segments of a black hue ; the white side stripes as before ; 12, 13 white, the shield greenish-brown above but white below, and the anal claspers white ; the white extends into the sides of 11, but the brown dorsal area runs back in a sharp point nearly to 12 ; on 4 the eye-spot is large, flattened in front and there velvet-black, but behind this is a prominent black vitreous bead-like elevation, smooth and without hairs ; instead of a complete and uniform ring there is a thickening of the yellow above and below the eye-spot, and the ends are narrowed, so that the appearance is much like that of eye-lids ; head as before, and it and segment 2 are one color, honey-yellow. To next moult 3 days. But one larva, after 2nd moult, differed from all the rest, being uniform light yellow-brown, the white area on 11 and 12 yellowish.

After 3rd Moult—Length .8 inch ; same shape and general color, the anterior segments a little darker, and their surfaces finely and thickly, but indistinctly, dotted green ; the middle segments lighter colored and distinctly dotted green ; the side bands salmon color, the last segments a redder salmon ; 13 white above base at extremity ; along base of body, with and a little above the spiracles, a white macular band ; on dorsum of 13 two small conical white processes (none on 12) ; on dorsum of 5 are two abbreviated bars of red-lilac, one on each side, in the subdorsal row, and on 6 to 10 is a small rounded lilac spot on each in same row ; on the side of 8 to 10 one similar spot to each ; on 3 to 6 low rounded knobs as at previous stage ; below the basal ridge is a small indistinct blue-lilac spot on each segment from 6 to 11; the ocellus as at previous stage, the buff ring now open at anterior side ; head as before, but greenish-yellow.

Towards the last of this stage the brown area has a green tinge, and the green dots become quite distinct, and the side bands are greenish ; the circlet of the eye-spot changes to red-buff. Later the top of the anterior segments became olive green, the dorsum after 5 light green, edged down the sides by dark green ; the side band pale green, as are the last segments ; under side pale greenish-brown ; the lilac spots unchanged ; the spots below spiracles blue. To next moult 4 days.

After 4th Moult.—Length 1.1 inch ; 9 days after the moult reached maturity.

Mature Larva—Length 1.6 inch ; cylindrical, the segments 3 to 5 much thickened, arched dorsally, then tapering to last ; color dull velvety-green, on 3, 4, 5, and on 12, 13 nearly solid, but a little specked with lighter green ; the other segments light and dark green in fine markings ; the basal ridge whitish-green ; under this is a fine black line from 3 to 12, and on 6 to 11 is a subtriangular blue spot in black edging on each segment just below the line ; 2 has a narrow yellow ridge in front, nearly flat on top, the curves rounded ; on anterior side of this and next it is a black subdorsal dash on either side ; behind the ridge is a black, rough or shagreened narrow band ; the scent-organs light yellow-brown ; on the side of 4 is a black ocellus, upon which rises a rounded vitreous black process, the circlet orange-red, having a black stripe within its anterior edge, and a blue spot on its upper outer side ; on 5 to 11 are four rows of small blue-lilac spots, each in fine black ring, two of the rows

being subdorsal, two lateral; on 12 only the two dorsals are present, on 13 neither; on the dorsum of 5 at posterior edge is a buff spot just outside the liiac spot and touching it. Under side deep ochre buff; feet and legs greenish-brown; head subovoid, bilobed, granulated, with a dull gloss; color olive-green.

Gradually the larva changes, the specks disappear on the anterior and also on the last segment, so that the extremities are solid green; on the middle segments the specks and marks become less distinct; the ridge at base becomes yellow, the whole under side port wine color; all the lilac spots change to bluish, the two spots on 5 to brown-buff.

Finally, before suspension the whole surface becomes dull ochrey-yellow, like *P. Troilus* at same period, the red of lower side becomes dull and yellowish, or dull salmon, the lilac spots on back change to pale black, but the spots below the basal ridge retain their blue color, but are dull. One day after suspension the larva pupated.

Chrysalis—Length 1.4 inch; greatest breadth .38 inch; the ventral side highly arched, the dorsum much incurved, the former narrow at summit, particularly on the thoracic segments, rounded, the sides sloping; the dorsum rounded, the sides somewhat flattened to the lateral ridge, which is prominent, carinated, and extends from end to end; head-case long, flattened transversely and about equally on the two sides, narrowest at base and widening gradually to the tips of the ocellar prominences; these are long, subpyramidal, divergent, the space between excavated roundly; mesonotum low, the sides very little convex, on the top a very small pyramidal elevation; surface all finely granulated; color variable; one phase shows the whole dorsal side a delicate green, with a darker green medio-dorsal stripe from mesonotum to last segment; below mesonotum two sub-dorsal low red tubercles, one on either side; on either side of the abdominal segments two rows of dull lilac points, forming a cross row of four to each segment; whole ventral side one shade of green, a little darker than dorsum and less yellow; the lateral ridge cream-color, more or less marked by a red line, which broadens on the process of head; on the ventral side below the head two red dots near the middle line; a series of white dots along the margins of wing cases; below the ridge, on last segments, are traces of blue spots.

Another resembles the above described, except that there is a yellow shade over the dorsal elevation and the medio-dorsal stripe is red.

Others are quite unlike these: the head case and mesonotum are yellow brown, and the rest of the dorsal side is yellow-brown with a pink tint; the stripe and the ridge brown; the dorsal spots blue, and dull blue spots below the ridge; whole under side light yellow-brown.

No butterflies from my larvæ emerged the same season. But of four chrysalids found in Florida 11th to 13th Sept., 1880, two gave butterflies 25th and 27th Sept., and two over-wintered, the butterflies emerging 2nd and 3rd Feb.

I received 24th August, 1880, from Dr. Wm. Wissfeld, Indian River, Fla., about a dozen larvæ of *Palamedes* in 1st and 2nd stages. My correspondent wrote: "On 15th I confined 2 ♀ in bag over limb of Persea carolina, or Red Bay. One began to lay eggs within a short time, and in an hour had laid 26. The other was heavy with eggs but would not lay till to-day, and has laid 7 eggs." These were sent me with leaves of the food plant, in a tin box per mail, and I received them 24th, the leaves still fresh, and the larvæ, which had hatched on the road, feeding. As this food plant is not found here I tried the larvæ with leaves of orange and lemon, to no purpose. But sassafras they took to at once. This is the food plant of *P. Troilus*, a species belonging to same sub-group as *Palamedes*. I had no difficulty in raising the larvæ to chrysalis. They are sluggish, like the larvæ of *Troilus*, and in general behave in same way, at all stages resting on a lining of silk which they had spun on middle of the leaf, whereby the leaf is curled or drawn together so as to afford a concealment. This they rarely leave, and then only when hungry, feeding on the end of the leaf until it becomes too small for a hiding place, after which they betake themselves to another leaf. But these larvæ do not cut into the side of the leaf and fold down the cut portion, as *Troilus* does. This Dr. Wissfeld states in reply to my inquiries. He farther says: "*Palamedes* roosts on the highest tree it can find, oak or palmetto. I have seen four to six near sundown fluttering about the tree, where they finally settled and remained. Sometimes three or four so roost on one large palmetto leaf."

DIFFERENCES WITHOUT DISTINCTIONS.

BY C. E. WORTHINGTON, CHICAGO, ILL.

If there is one thing more than another that fills the brain of an amateur Entomologist with despair, when he first makes the acquaintance

of the long lists of largely incongruous and incomprehensible names that he is expected to master, it is the utter absence of anything in the system of nomenclature tending to show the relations of various forms to each other, or of varieties to the parent or more abundant form. There is nothing to show at a glance the results of the experience of others and to attain any idea of the true relationship of allied forms. The student must either acquire the knowledge by slow and persevering experiment, or oftentimes forego the acquisition altogether, because time and the rarity of books will not permit him to gain it. We cannot start where others left off, but must follow their paths step by step, only hoping to gain the point they reached soon enough to be able to penetrate a little further.

Most conspicuously is this the case as regards the so-called varieties of variable species. Let a student in England, for instance, take up Mr. Edwards' Catalogue of North American Butterflies, and the first species is listed with three "dimorphic" varieties and one "sub-variety." The theory of their origin is well known, and the facts regarding their appearance at certain seasons, but this cannot be learned from the list, and must be gained from various contributions on the subject written at many times and distributed through many books—a comparatively easy task as regards *Papilio ajax*, though less easy were the researches of some species in question conducted by an obscure author and published in some rare book in a foreign language.

Under the present system *Papilio Walshii*, *Pieris pallida* and *Grapta umbrosa* are designated dimorphic varieties, although no two of them bear the same or similar relations to the species to which they belong.

It is hardly to be expected that we can arrive at an exact and universally acceptable definition of a species, or that the time will soon come when extremists for the sake of advertisement or other reasons will not persist in declaring accepted species as mere varieties or *vice versa*, or that such persons will cease to set dictum above experiment; but it does not seem impossible to adopt some system that shall indicate to a certain extent the relations of many forms, and at the same time elastic enough to be acceptable to all.

For the purposes of this article, however, I consider it necessary to submit a brief description of what I hold to constitute a species, in the hope that it will substantially agree with the conceptions of others in the main.

We may define a species as an aggregation of individual forms of life

having the same general characteristics, but exhibiting definite, transmittable structural differences from all other forms of life—a definition which does not touch the construction of genera.

From each species are given off from time to time individuals in greater or less numbers differing from the parent form and from any other species; these forms sometimes exhibit transmittable differences, sometimes not transmittable, but in nearly every case are connected by almost imperceptible gradations or known circumstances of origin with the form from which they sprung, the extremes of variation being sometimes so great that in the absence of knowledge of intergrades or attendant circumstances, they would readily be declared distinct species.

In the case of those species where the departures from the normal form appear at all seasons and in all broods without restriction to locality and with satisfactory intergrades, it seems to me that a good end would be served by ceasing to consider them "varieties," but merely terming them "variations" and designating the extremes of variation by letter, as Variation A, or by name, if the practice be more agreeable, as in the case of *Catocala scintillans*, a name given to an extreme variation of *C. innubens*, which occurs in all broods without restriction to locality and with perfectly satisfactory intergrades, which would thus become Variation *scintillans* a name that would at once express its relation to *C. innubens*.

Thus relieved of an embarrassing number of forms whose title to the dignity of varieties is, to say the least, dubious, we might classify actual varieties as follows:

Seasonal—Where a certain variation of form appears only or mainly in certain broods of many brooded species, disappearing in following broods only to reappear in the succeeding year at its proper season, as *Papilio Walshii*.

Climatic—Where varieties occupy considerable habitats, often to all appearance distinct species when viewed at the extremes, but having common ground where intergrades occur or either form is produced indiscriminately, as in the varieties of *S. alope*.

Dimorphic—Where well marked varieties do not thoroughly intergrade, but appear in all broods and are produced indiscriminately regardless of sex, as in *Grapta comma*.

Occasional—When aberrant forms are produced in both sexes rarely and at irregular intervals, as *Papilio Calverleyii*.

Melanic or Albinic—Male or female, or local, the names of which are sufficient definition.

This would not preclude the use of the term sub-variety as now used, but would open the way for the use of the still more expressive term of "sub-species," applicable to varieties highly differentiated, and especially when the differentiation has so far progressed as to begin in the larval state.

Would not the application of some such system to the catalogues be of much aid in study and designate approximately the relations of many forms to each other?

I offer this as a suggestion; the subject will certainly bear discussion, and some permanent good may come of it surely. If the result of the discussion is the adoption of the system herein indicated, after elaboration and revision, or of some other system that will in some way indicate the relationship of forms in their names, my end will be attained. That some reform is necessary I am convinced.

THE NORTH AMERICAN SPECIES OF MAMESTRA, Ochs.

BY A. R. GROTE.

The species of this genus have hairy eyes, unarmed tibiæ and a tufted thorax. The dorsum of the abdomen is more or less tufted, but in some species the tuftings are not noticeable. Several species which seem to me to belong to *Graphiphora (Taeniocampa)* have been referred to this genus; among these I may mention *orobia* of Harvey, *modesta*, *incincta* and *thecata* of Morrison, and the species described by me as *rufula* and *puerilis*. I also take out the *curta* and *promulsa* of Morrison, which I believe to be species of *Anarta*. The species included under *Dianthoecia* differ from *Mamestra* by the extruded ovipositor. But they appear to arrange themselves naturally among the species of *Mamestra*, and perhaps do not really differ in a generic sense. They are here included.

purpurissata *Grote*, P. Ent. S. Phil. 3, 82. Can.; Eastern and Middle States.

nimbosa *Guen.*, Noct. 2, 77; Speyer, Ent. Can.; Zeit. 142. Eastern and Middle States.

discalis *Grote*, Bull. U. S. Geol. Surv., 3,797. Colorado.

imbrifera *Guen.*, Noct. 2, 76. Can.; Eastern and Middle States.
latex *Guen.*, Noct. 2, 78. Can.; Eastern and Middle States.
† condita *Guen.*, Noct. 2, 78, pl. 8, fig. 5. "New York."

N. B.—This species is not known to me. In some collections I have found *Dianth. lustralis* determined as "*condita.*" But from his figure and description, which latter I here translate, Guenée's species must be quite different.

"♀ 35 m. m. The smallest of the genus (i. e. *Aplecta*). Wings slightly elongate, the primaries nearly entire, rather wide, of a grayish white much powdered with blackish, which makes them griseous; except the edges of the lines and the two ordinary spots which remain white and empty. These latter are very regular; the orbicular longitudinally ovate. The three first lines very distinct, dentate, black; the t. p. line sending a sharper tooth in the sinus of the reniform. The subterminal very nebulous, pale, margined anteriorly by a vague shade of pale ferruginous; the upper edge of the claviform alone visible. The two median spots separated by a dark shade surrounded by black. A basal black ray crosses the half-line. Secondaries dirty yellowish white, with traces of a discal spot, of a much twisted median line and of a sub-anal blackish spot. Terminal marks thick, contiguous and better marked. Beneath with the spot and line well indicated, blackish, thick, the line continuous on the primaries. Abdomen short, with small crests. Palpi ascending, slighter than in the other species (i. e. of *Aplecta*)."

This description and the figure of Guenée differ throughout from *lustralis*. In my List I originally transferred Guenée's Aplectas to this genus.

adjuncta *Boisd.;* Guen. Ind. 243; Noct. 1, 199. Can.; Eastern and Middle States.
lubens *Grote*, Tr. Am. Ent. Soc., 113, 1875; *rufula* Morr., P. A. N. S. P. 62, 1875; *lubens* Morr., P. B. S. N. H. 119, 1875. Can.; Eastern and Middle States.
Beanii *Grote*, Can. Ent. 9, 87; N. Am. Ent. 1, 12. Texas; Illinois.
legitima *Grote*, Proc. Ent. Soc. Phil. 3, 82. Can.; Middle, Western and Eastern States.
liquida *Grote*, Papilio, 1. Washington Territory.
lilacina *Harvey*, Bull. B. S. N. S. 2, 119. Middle States.
illabefacta *Morr.*, P. B. S. N. H. 141, 1874. Eastern and Middle States.

N. B.—This is in my opinion a more obscurely colored grayish-brown form of the preceding.

noverca *Grote*, Can. Ent., 10, 236. Nebraska; Cal.; Col.

Goodellii *Grote*, Can. Ent., 7, 223. Eastern and Middle States.

assimilis *Morr.*, Bull. B. S. N. S. 2, 119. Eastern and Middle States.

rosea *Harvey*, Bull. B. S. N. S. 2, 119. Can.; Eastern and Middle States.

congermana *Morr.*, Can. Ent. 6, 106. Eastern and Middle States.

vindemialis *Guen.*, Noct. 1, 344; Grote Proc. Ac. N. S. 418, 1875; *Ceramica rubefacta* Morr. Can.; Eastern and Middle States.

† w-album *Guen.*, Noct. 1, 345. "Florida."

picta *Harris*, Ins. Inj. Veg., 329: *Ceramica exusta* Guen., Noct. 1, 344. Can.; Eastern and Middle States.

N. B.—I am indebted to Prof. Fernald for a bred specimen of *picta;* there is a slight divided thoracic crest and I do not see the necessity for disturbing the original generic reference of Harris. The following seven species have the typical markings of the genus.

Farnhamii *Grote*, Bull. B. S. N. S. 1, 138, pl. 3, fig. 2. Colorado.

grandis *Boisd.*, Gen. 950; Led. Noct. 90; Guen. Noct. 2, 105, pl. 8, fig. 10. "Greenland?" Can. to Middle States.

nevadæ *Grote*, Bull. B. S. N. S. 3, 84. Nevada.

subjuncta *G. & R.*, Tr. Am. Ent. S. 2, 198, pl. 3, fig. 71; Grote B. B. S. N. S. 2, 12. Can.; Eastern and Middle States.

atlantica *Grote*, B. B. S. N. S. 2, 12; Grote Check List 6; var. *discolor* Speyer, S. E. Z. 142.

N. B.—This may be = the European *dissimilis*.

Dimmockii *Grote*, Proc. A. N. S. Phil., 420, 1875. Eastern and Middle States.

distincta *Hubn.* Samml.; G. & R. Tr. Am. Ent. Soc. 2, 197, pl. 3, fig. 72; Grote, B. B. S. N. S. 2, 156 *(Mamestra); Dicopis vitis* French, Can. Ent. 11, 76. Middle and Western States to Tex.

mucens *Hubn.* Zutr. 515–16; Grote Can. Ent. 11, 206. Same localities as preceding.

confusa *Hubn.*, Zutr. 495-6; Grote Bull. B. S. N. S. 2, 12. Same localities as preceding.

trifohi *Rott.* Nat. 9 & 131; *albifusa* Walk. B. M. Cat.; *chenopodii* S. V.; Speyer S. E. z. 138. New York to Oregon.

N. B.—The Oregon specimens are more concolorous, without the prominent W-mark of the s. t. line relieved by darker preceding dashes.

Speyer, who calls the N. Am. spec. from N. Y. var. *major*, says that *trifolii* is found on the old continents from Spain to Peking.

chartaria *Grote*, Bull. B. S. N. S. 1, 138, pl. 4, fig. 12. California.
defessa " Can. Ent. 12, 88. California.
pensilis " P. A. N. S. P. 199, 1874. Vancouver; Sauzalito, Cal.
vicina " Bull. B. S. N. S. 2, 119; *teligera* Morr. New York to Texas.

N. B.—To this form *pensilis* is nearly allied; the extension of the ovipositor does not seem to be a constant feature. I have a specimen from California, " Shasta," which seems to be the same as the Eastern *vicina*. Again I have an Illinois specimen which indicates a closely allied but probably distinct species from the East.

anguina *Grote*, n. s.

♂. Allied to *vicina*, but with the t. p. line drawn in below the reniform, narrowing the median space below the vein. No red or brown tintings. Median space shaded with blackish. The general color is gray; the stigmata pale, much as in *vicina*, except the claviform, which is much larger and wider, while it also extends across to t. p. line. A distinct black dash at internal angle to s. t. line at its sinus on submedian fold. Hind wings white with soiled borders. No dark dashes before the subterminal line which are in both *pensilis* and *vicina*. *Expanse* 28 mil. Illinois, Dr. Nason, May 31.

acutipennis *Grote*, Can. Ent. 12, 214. Nevada; Arizona.

N. B.—Also closely allied to *vicina*. The fore wings appear more elongate and sharper.

capsularis *Guen.*, Noct. 2, 22, pl. 8, fig. 3; *Paphia propulsa* Walk. 529. Middle States.
detracta *Walk.* C. B. M. 732; *clavipicna* Grote, B. B. S. N. S. 1, 194. Can.; Eastern and Middle States.
cuneata *Grote*, B. B. S. N. S. 1, 139, pl. 4, fig. 9. California; Wash. Territory.
brachiolum *Harvey*, Can. Ent. 8, 6. Texas.
marinitincta " Bull. B. S. N. S. 2, 273. Texas.
laudabilis *Guen.*, Noct. 2, 30, pl. 8, fig. 4. *Var.* illaudabilis *Grote*, Can. Ent. 7, 127. Alabama, Tex. to California.

N. B.—The typical *laudabilis* has the median space shaded with reddish. The var. *illaudabilis* from Cal. and Texas has it filled with black, and the base of the wing and thorax often shaded with black. Another

interesting Californian specimen has the fore wings concolorous dusky greenish, but I do not think is a different species, though this is possible. Guenee refers the species to *Hecatera*, but I have classified it as a *Mamestra;* it is allied to the species with which I here associate it.

4-lineata *Grote*, Bull. B. S. N. S. 1, 140, pl. 4, fig. 15. California.
olivacea *Morr.*, Proc. B. S. N. H. 143, 1874. Can. to Vancouver.
alboguttata *Grote*, Bull. B. S. N. S. 3, 85. Oregon.
comis " " " Vancouver.
sutrina " Papilio 1, 5. Colorado.
lustralis " Can. Ent. 7, 223. Middle and Western States.
meditata " Bull. B. S. N. S. 1, 104. Eastern and Middle States.
innexa " " 2, 123. Texas.

N. B.—Mr. Morrison has referred this species to *Mamestra*, in correction of my original determination.

renigera *Steph.* 2, 16; Grote, Can. Ent. 6, 132 *(Mamestra); herbimacula* Guen. Noct. 1, 133. Can.; Eastern and Middle States.
cinnabarina *Grote*, P. B. S. N. H. 241, 1874. *Var.* ferrea *Grote.*

N. B.—This species is allied to the European *M. strigilis* and *fasciuncula.* The var. *ferrea* occurs in Vancouver Island (Can. Ent. 7, 25) and Washington Territory (Morrison leg.) The fore wings are different shades of yellowish ferruginous, while they are more brownish in the typical form from California.

lorea *Guen.*, Noct. 1, 126. Can.; Eastern and Middle States.
niveiguttata *Grote*, B. B. S. N. S. 1, 194, pl. 4, fig. 16. California.
leucogramma " " 1, 140. California.
palilis *Harvey*, " 2, 273. Texas.
† repentina *Morr* P. B. S. N. H. 118, 1875. "New Jersey."
† ectypa " " " "West Virginia."
insolens *Grote*, Bull. B. S. N. S. 2, 65. California.
arietis " Bull. U. S. Geol. Surv. 5, 207. California.

N. B.—This may be the ♂ of *insolens;* it is very different in appearance from the more distinct markings.

? quadrannulata *Morr.*, P. A. N. S. P. 430, 1875. Nebraska.
? rugosa " Proc. B. S. N. H. 119, 1875. Maine.
† Rogenhoferi *Moeschl.*, S. E. Z. 269, 1870. "Labrador."
† subdita " W. E. M. 363, 1860, T. 9, fig. 7. "Labrador."
† phoca " " 197, 1864, T. 5, fig. 15. "Labrador."

NEW NOCTUIDÆ, WITH LIST OF THE SPECIES OF PERIGRAPHA.

BY A. R. GROTE.

Agrotis nanalis, n. s.

♀. The smallest species known to me. All the tibiæ spinose; eyes naked; body untufted. A slender species which may be compared with *opaca*. The fore wings are blackish with the lines lost. The stigmata are concolorous, difficult to make out. The orbicular is elongate, the reniform vague, upright, broad; the spots are picked out by a brown shading which fills the cell and marks the subcostal and median veins. S. t. line a vague blackish even shade. Hind wings concolorous fuscous griseous, with the veins soiled and a faint discal mark. Beneath griseous, the primaries a little brownish. The costal preapical dots visible beneath and to be made out on the upper surface. Abdomen like hind wings. Head brownish; tegulæ blackish, disc of thorax paler. *Expanse* 26 mil. Nevada.

Agrotis esurialis, n. s.

This species has all the tibiæ spinose. In color it is like *perconflua*, being of a pale ruddy brown over ochrey. The stigmata are concolorous, and as in *Normaniana*, set in a black spot. The orbicular nearly touches the reniform inferiorly, leaving a blackish brown v-shaped space between the stigmata. The orbicular is open to costa, oblique, widening above, preceded by a narrow black shade on the cell. Reniform widening inferiorly, constricted, upright. Lines dark; t. a. line single, marked on costa above the orbicular, sinuate, incomplete. T. p. line indicated by venular dots, as also the s. t. line, which is followed by a faint narrow pale shade and is inaugurated on costa by a curved mark. The species seems to belong to the series of *rubifera*, *perconflua*, *Hilliana*, *conchis*, *Normaniana*. Hind wings pale fuscous with the fringes and outer edge colored like primaries. Head a little paler than thorax, with the palpi darker at the sides. Abdomen at the sides and beneath tinged with rosy brown. Wings beneath tinged with ruddy, especially on the margins and outside of the extra-mesial fuscous line. Discal marks indicated. *Expanse* 31 mil. Washington Territory, coll. by H. K. Morrison.

Agrotis colata, n. s.

♀. Like *Versipellis*, but a little larger and without the white lines on

the veins. Entirely dark purply brown; thorax and head reddish brown. Stigmata a little hoary; orbicular large, open; reniform wide; claviform indicated. Lines very faint; an indistinct paler shade following the t. p. line; the terminal space also indistinctly paler. Hind wings concolorous, dark fuscous. Mount Hood; one fresh female specimen. Cannot be confounded with any other species from the color and its affinity with *versipellis*.

Agrotis semiclarata, n. s.

♂ ♀. Allied to *gravis* and *Vancouverensis*, smaller than the latter and without the pale cast of *gravis*. A thick dark brown basal dash extending into the claviform, and faintly cut by the t. a. line. Rich brown with the costal region (especially in the ♂) suffused with darker. Spots concolorous; cell shaded with black. S. t. line pale, without the small teeth at the middle and below apices of its allies. Head and collar rich yellow brown; tegulæ shaded with pale, but not so pale as in *gravis*. Beneath the costal half of secondaries is fuscous, leaving the lower portion of the wing including the border pale; a spot and common line. Above the hind wings are fuscous and rather dark in both sexes. This species may be known by the hind wings beneath being half pale, including the lower portion of the border, which is usually darker. The three species, *gravis*, *vancouverensis* and *semiclarata*, are nearly allied: their Eastern allies seem to be *volubilis*, *venerabilis* and *stigmosa*.

Xylomiges perlubens, n. s.

♂. Allied to *rubrica*. Fore wings variegated with reddish and gray. Lines double, brownish, marked on costa by blackish dots. Orbicular pale, with brown centre and blackish annulus, upright; reniform with an inferior stain, a curved reddish inner streak, indistinct outwardly. Veins blackish. T. p. line followed by white venular points. S. t. line preceded by a deep reddish shade marked opposite the cell and again below vein 3. Terminal space blackish with a gray apical patch. External margin dentate; fringes cut with pale. Hind wings and fringes pure white; a broken terminal line; beneath with a dotted extra-mesial line and discal spot. Primaries beneath with the terminal space whitish; subterminal space stained with brownish; a discal mark very near the dotted extra-mesial line which hardly reaches the margin. Eyes hairy; tibiæ unarmed; antennæ brush-like: abdomen tufted at base. Wings elongate. Thorax and head reddish brown: collar edged with gray: abdomen pale reddish

fuscous. *Expanse* 39 mil. Washington Territory, collected by H. K. Morrison.

Perigrapha Led.

The North American species which I refer to this genus differ from *Graphiphora (Taeniocampa)* by the thorax having a sharp ridge of scales. The stigmata are usually large and confluent. The eyes are hairy ; tibiæ unarmed. The genus *Stretchia* of Mr. Hy. Edwards is based on a species of *Perigrapha*. I had made one Californian species the type of the genus *Acerra ;* but I believe this now well-known species *(normalis)* is not generically distinct from the European species.

normalis *Grote*, Bull. B. S. N. S. 2, 162; Check List fig. 4. California.
muricina " " " 3, 85. Oregon.
Behrensiana " Can. Ent. 7, 71. California.
plusiiformis *Hy. Edw.*, Pac. Coast Lep. 4, 3. Nevada.
erythrolita *Grote*, Can. Ent. 11, 208. California.

Bomolocha fecialis, n. s.

♀. Similar to *bijugalis ;* the basal half of the primaries is of an even rich but comparatively pale brown, not blackish brown as in its ally. It encloses a discal dot and is limited inferiorly by a white flexed oblique line which does not attain the margin. The brown portion of the wing is limited by the white upright and undulate t. p. line, which is not so sharply produced at median vein as in its ally. Subterminal line very faint and the usual apical streak quite undecided. Outside of the t. p. line the wing is paler, but not so white as in its ally. The expanse is the same. New York. This may be a variety of *bijugalis*, but it looks quite different. It cannot be a sexual form as I compare it with ♀ *bijugalis.*

Bomolocha? incusalis, n. s.

♀. A slender bodied form with the wings a little narrower than in our Eastern species ; the palpi a little shorter ; the abdomen smooth. The entire insect is faded dusty ochrey with the median space of primaries dark brown and contrasting. It is bounded by the two median lines, the first even, upright, nearly straight, a little oblique. The outer line curves inwardly below median vein, forming an arcuation to internal margin ; it is followed by a faint line, sometimes not noticeable. S. t. line darker than the wing, irregular, vague. Hind wings with faint traces of lines. The comparatively narrow dark median space of primaries above shows a

discal mark. *Expanse* 23 mil. Colorado Rio (Prof. Glover); Arizona (Mr. Hy. Edwards). The shorter labial palpi and the wings narrower at base may distinguish this species generically. I regret not to know the male, which would decide the genus.

Deilinia glomeraria Grote.

In a letter, with regard to the species of *Deilinia* described in the March number of *Papilio*, Mr. G. R. Pilate says: "I have the male of *glomeraria* and it is not different from the female, the antennae are not pectinated. I find I have no males of *septemfluaria*. They are both common insects early in the spring, before the leaves are out, but are difficult to catch, as they are disturbed by the slightest noise and fly with the wind, which generally blows pretty hard at that time of the year. I have seen them go up out of sight." Dr. Packard, to whom I submitted these species, stated that he thought he had seen specimens of *glomeraria* from a different locality, but neither species is apparently included in his work on the family.

ON SOME NEW SPECIES OF CHALCIDIDÆ FROM FLORIDA.

BY WM. H. ASHMEAD, JACKSONVILLE, FLORIDA.

Group Eurytomides.

EURYTOMA VAGABUNDA, n. sp.—♀. Length .10 inch. Deep black. Head and thorax coarsely punctate; antennæ 8-jointed, black and pubescent; eyes black; thorax black, very coarsely punctate, collare transverse quadrate, parapsidal grooves indistinct, scutellum hardly separated from the praescutellum, convex, narrowing but rounded posteriorly; metathorax coarsely punctate; abdomen black, smooth, and highly polished, peduncle short, a series of very fine punctures along the basal margin of 2nd, 3rd and 4th segments, only perceptible with a high power, tip pubescent; wings hyaline, iridescent; veins slightly yellowish, no stigmal spot; legs reddish yellow, tibiæ slightly paler, feet pale.

Captured on Spanish Bayonet (*Yucca* sp.)

DECATOMA FLAVA, n. sp.—♂ and ♀. Length .12 to .15 inch. Head, thorax, abdomen, antennæ and legs a bright greenish yellow; head and thorax rather coarsely punctured; ocelli brown, eyes light brown with

darker spots; 2nd antennal joint slightly reddish; tips of mandibles brown, palpi whitish; wings hyaline, iridescent, ligaments of wings brown, stigma brown black, a large dark blotch extending from stigma across to near the hind margin, and in some specimens a slight indication of another blotch between this and base of the wing; abdomen smooth and shining, very slightly infuscated on dorsum; a brown spot at base of posterior coxæ; outer surface of posterior femora dark brown excepting at base and tip, inner surface more of a reddish brown.

Described from 8 specimens, 2 ♀ and 6 ♂, bred from an oak gall (*Cynips q. ficus* Fitch?)

DECATOMA QUERCI, n. sp.—♂. Length .12 inch. Head green, slightly yellowish and coarsely punctate, vertex enclosing ocelli brownish black, mandibles tridentate, tipped with black, gula black; eyes greenish brown with darker spots; antennæ 7-jointed, pubescent, greenish yellow, 3rd joint dark; thorax coarsely punctate and slightly hairy; collare transverse quadrate, but broader than mesonotum, greenish yellow, with a slight darker transverse band of brown in centre; mesonotum, scutellum and metathorax dark reddish brown; parapsidal grooves indistinct; scutellum longer than broad and posteriorly rounded; abdomen smooth, shining black or brownish black, more or less of a reddish brown anteriorly, peduncle two-thirds as long as abdomen, black; wings hyaline, veins hyaline, stigma black, with a brownish black blotch extending from it to more than half way across the wing; legs, anterior pair greenish yellow, middle tibiæ infuscated, posterior tibiæ brownish black, tarsi black.

Raised from a dipterous gall on *Quercus Catesbæi.*

DECATOMA LANÆ, n. sp.—♀. Length .08 to .10 inch. Honey yellow. Head finely punctate, thorax coarsely punctate; a small black spot on vertex hardly enclosing ocelli, the latter yellowish; tip of mandibles black; antennæ 8-jointed, honey yellow and gradually increasing in size to tip; collare narrow; scutellum somewhat oval, narrowed anteriorly and with the disk brown; abdomen yellowish red, dorsum infuscated, peduncle short, posteriorly brown or black; wings hyaline, stigma black and the blotch smoky and hardly extending half way across the wing; legs yellowish, posterior tibiæ only black or brownish black.

♂. Differs very little from above excepting in size, a longer peduncle and in antennæ being but 7-jointed.

Described from numerous specimens raised from a woolly gall (*Cynips q. Turnerii* Ashmead) on *Quercus aquatica.*

DECATOM PHELLOS, n. sp.—♂. Length .10 inch. Head brown black, finely punctate; eyes greenish brown; antennæ 7-jointed, scape and joints 3 and 4 dark, balance rufous, thorax dark brown, coarsely punctate; collare broader than mesonotum, beneath reddish brown, parapsidal grooves almost obliterated; scutellum convex, coarsely punctate; abdomen smooth, black and shining, peduncle brownish, hardly the length of abdomen; wings hyaline, veins slightly yellowish; stigma black, smoky blotch beneath extending more than two-thirds across the wing; legs honey yellow, coxæ dark, middle femora and tibiæ slightly darker, posterior femora and tibiæ brown black.

Raised from gall on *Quercus phellos.*

DECATOMA FOLIATÆ.—♀. Length .10 inch. Head black, coarsely punctate; eyes brown; antennæ 9-jointed, brownish, sparsely pubescent; scape yellowish, last three joints somewhat connate; thorax coarsely punctate, collare attenuated and a beautiful orange yellow; some specimens have only the corners so colored; abdomen brownish black, smooth and shining; wings hyaline, veins almost hyaline, slightly yellowish, a large black circular stigma with tip of stigmal vein protruding, iridescence strongly defined on hinder wings, the whole outer margin sometimes being a beautiful violaceous; legs a beautiful bright orange yellow, with tarsi and feet slightly paler and posterior coxæ black.

♂. Length .08 inch; 2nd joint antennæ larger, scape black, corners of collare orange yellow, peduncle two-thirds as long as abdomen, coxæ black, stigma spot somewhat triangular; palpi and labrum yellowish white; otherwise same as ♀.

Described from numerous specimens raised from leafy live oak gall, *Cynips q. foliata* Ashmead.

DECATOMA BATATOIDES, n. sp.—Length .15 of an inch. This species in punctation and shape very much resembles *D. foliatæ*, but may be easily distinguished by the following differences: In size; eyes, face and antennæ brown, mouth parts and palpi yellowish, coxæ and legs a uniform lemon yellow, collare and mesothorax lemon yellow, sternum black, sutures of parapsides yellowish, posterior margin of scutellum yellowish and stigma a mere dot.

Described from several specimens bred from the live oak potato gall, *Cynips q. batatoides* Ashmead.

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ON THE EARLY STAGES OF HYPENA SCABRA, FABR.

BY D. W. COQUILLETT, WOODSTOCK, ILL.

EGG.—Globular, slightly flattened above, more decidedly so below; lower half smooth; upper half deeply grooved, the interspaces rounded and marked with fine transverse impressed lines; whitish, the upper half sometimes dotted with dark brown; transverse diameter nearly ½ mm. [The top of this egg closely resembles that of the unarmed Rustic *(Agrotis saucia)* figured in Riley's 8th Report, page 37, fig. 24.]

LARVA.—First Stage: Body green; a dark colored dorsal line, edged each side with a whitish line; a white subdorsal and stigmatal line; piliferous spots green, each bearing a short black hair; venter green; head polished green; body provided with only 14 legs. When jarred from their perch the larvæ hang suspended by a silken thread. I observed only two moults in these larvæ, and the color and markings after each moult are the same as in the first stage. Length at maturity about one inch.

CHRYSALIS.—Of the usual form, dark brown; length about 14 mm.

On the 15th of May, 1880, I enclosed a moth of this species in one of my breeding cages in which some red clover was growing; the next day it deposited about 50 eggs, placing them singly on the under side of the leaves, and rarely upon the stems of the clover, sometimes consigning several eggs to the same leaf. They hatched out on the 23rd of the same month, and all of the larvæ reached maturity at about the same time, and then crept beneath dead leaves, etc., and spun their cocoons. The first moth issued June 28, and the last one July 2.

On the 6th of July of the same year I obtained another laying of eggs, and the larvæ from these, like those from the first laying, all reached maturity at about the same time.

A larva which I found July 11, 1879, spun its cocoon August 22nd, but died before producing the imago; another spun its cocoon September 6th, disclosing the imago Sept. 18th. On the 30th of October, 1880, I

found a fresh female of this species in a shock of corn; the moth was killed the same day and her ova were found to be undeveloped, from which fact, and the situation in which the moth was found, it is very probable that the imago hybernates. The moth from which I obtained the first laying of eggs was very much faded and worn, and presented all the appearance of having hybernated. Prof. C. V. Riley also holds the opinion that the imago hybernates, and adds* that in more southern localities the chrysalids also hybernate, as he has taken them under bark in the winter. He states that the larvæ also feed upon *robinia*, but I have never taken them upon any other plant than clover *(Trifolium pratense)*.

There appears to be only two broods produced in one season in this latitude; I have never taken the larvæ later in the season than the first week in September, and female moths enclosed in my breeding cages at this time refused to deposit their eggs, although earlier in the season they deposited eggs readily in confinement.

Scabra is very abundant in this locality, frequenting clover meadows in company with *Plusia precationis* and *Drasteria erechtea*. When flushed it flies very rapidly a short distance and then suddenly alights upon a leaf and quickly crawls to the under side, concealing itself as much as possible from sight.

Below is given the time passed by this species in its different stages:—

From deposition of egg to hatching,	- -	4 to 6 days.
" hatching to first moult,	- -	17 "
" first to second moult,	- - -	3 "
" second moult to spinning cocoon,	-	5 "
" spinning cocoon to imago,	- -	12 to 14 "

ENTOMOLOGY FOR BEGINNERS.

THE RED-HUMPED APPLE TREE CATERPILLAR.
(Notodonta concinna)

BY THE EDITOR.

This insect appears in the perfect or moth state (fig. 9) during the latter part of June. When its wings are expanded it measures from one inch to one inch and a quarter across. The fore wings are dark brown

* Bulletin No. 3, U. S. Ent. Commission, p. 27.

on the inner margin and grayish on the outer margin with a dot near the middle, a spot near each angle and several longitudinal streaks along the hind margin dark brown. The hind wings of the male are brownish or dirty white, those of the female dusky brown; the body is light brown, the thorax of a darker shade.

Fig. 9.

The female deposits her eggs in a cluster on the under side of a leaf during the month of July, where they shortly hatch into tiny caterpillars, which at first consume only the substance of the under side of the leaf, leaving the upper surface unbroken, but as they increase in size they devour the entire leaf. When not eating they lie closely together on the twigs and sometimes entirely cover the branches they rest on; they attain their full growth during August or early in September. When mature the larva presents the appearance shown in fig. 10. The head is coral red and there is a lump on the back on the fourth segment of the same color; the body is traced lengthwise by lines of black, yellow and white, and has two rows of black spines along the back, and other shorter ones upon the sides from each of which there arises a fine hair. The hinder segments taper a little and are always elevated, as shown in the figure, when the insect is not crawling. It measures when full grown about one and a quarter inches long.

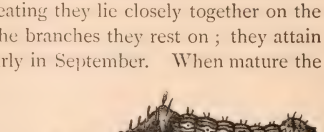

Fig. 10.

They entirely consume the leaves of the branch on which they are placed, and when these furnish insufficient food to bring them to maturity, the adjoining branches are laid under tribute. When handled they discharge from their bodies a transparent fluid of a strong acid smell, which doubtless serves as a defence from their enemies, especially birds, since their habit of feeding openly in large flocks renders them particularly liable to attack from these active foes.

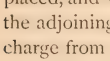

Fig. 11.

When full grown they all disappear about the same time, descending from the trees to the ground, where they conceal themselves under leaves upon or slightly under the earth. Here, after a long time, the larva changes to a brown chrysalis, fig. 11, and remains in this condition until late in June or early in July of the following season. They are very

generally distributed, but seldom abundant, and while very partial to the leaves of the apple tree, feed also on those of the plum, pear, cherry, rose and thorn.

As they feed in flocks during their entire existence, these larvæ can easily be gathered and destroyed either by cutting off the limbs on which they are feeding and burning them, or by dislodging them by suddenly jarring the limbs, when the larvæ fall to the ground and may be trampled under foot.

PTEROPHORIDÆ.

BY CHARLES FISH, OLD TOWN, MAINE.

(Continued from Page 74.)

ŒDEMATOPHORUS LUGUBRIS, n. s.

Front of head and palpi very dark fuliginous, the vertex slightly lighter. Form of palpi as in *O. Baroni*. Antennæ dotted above with white and blackish scales, tawny brown beneath. Thorax color of vertex. Abdomen slender, with scales slightly raised at extremities of joints, dark fuliginous brown, rather copiously sprinkled with black scales. Legs dark brown gray, the middle tibiæ whitish just before the middle and end bands, and all the tarsi whitish at base of joints; spurs also whitish at base. Fore wings dark smoky gray, with a dusting of black scales; inner margin and second lobe with a tinge of brown. An obscure blackish spot before base of fissure bordered posteriorly by gray scales. A longitudinal black spot on costa opposite base of fissure, embracing the costal cilia, and obscurely connected with the spot before base of fissure. Faint indications of two smaller black spots on costal margin of anterior lobe. Cilia brownish fuliginous, with a few white hairs on inner margin of anterior lobe near apex; also some of the cilia of inner margin of posterior lobe tipped with white. Hind wings and cilia, as well as under side of wings, cinereous.

Alar expanse 27-29 mil. California, Hy. Edwards, O. T. Baron.

This species is allied to *O. griseseens* Wlsm., but differs in the more slender body, and the almost entire absence of white in the markings, thus giving the entire insect a very sombre appearance. The hind tibiae

and tarsi are much darker, the latter being lightened only at the base of the joints, while in *grisescens* they are whitish, and darkened only at end of joints; still it may ultimately be found to be only a strongly marked variety of Walsingham's species.

LIOPTILUS GRANDIS, n. s.

Head, thorax, palpi, antennae, abdomen and both pairs of wings, including their cilia, of nearly a uniform pale cinnamon color. Legs of about the same color as the wings, with tarsi somewhat lighter. Fore wings less than one-third cleft, with the anterior lobe extending into a falcated point which reaches over the shorter and broader posterior lobe. No markings except faint dots of a darker brown in some examples at the extremities of the veins on the posterior lobe. Under side of wings same as above. The largest *Lioptilus* at present known. Alar expanse 34 mil. California, Hy. Edwards, J. Behrens, Dr. J. S. Bailey.

LIOPTILUS KELLICOTTII, n. s.

Head ochreous brown, whitish between antennae. Palpi rather long and slender, second joint with a small tuft of raised scales at the extremity on upper side, third joint bending downward, ochreous brown. Antennae whitish above, pale brownish beneath. Thorax and abdomen pale brownish ochreous, the latter striped longitudinally with pale brown lines. Anterior and middle legs pale brown exteriorly, pale brownish ochreous interiorly. Posterior legs whitish ochreous, tarsi nearly white.

Fore wings pale brownish ochreous, some examples dusted more or less with dark brown scales in the median space. A dark brown dot exactly at base of fissure, two on costa and one on inner margin of first lobe near the apex; usually four at end of second lobe tipping veins 2, 3, 4 and 5. None of these dots extend into the cilia. Cilia of fore wings concolorous. Hind wings and cilia, also under side of both pairs, cinereous brown with a silky lustre. Alar expanse 28-30 mil. Buffalo, N.Y. Bred by D. S. Kellicott, from larvae infesting the stems of some species of *Solidago*. A full account of the larval habits can be found in an article by Prof. Kellicott in CAN. ENT., vol. xii., No. 6. I will state in passing that the other plume moth mentioned in the same article, the larvae of which feed upon the foliage of the same plants, is *Aciptilus montanus* Wlsm.

ACIPTILUS BELFRAGEI, n. s.

Front of head ochreous brown, vertex pale brownish gray. Palpi brown above, whitish underneath. Antennae pale brown. Thorax pale brownish gray, tegulae whitish. Abdomen pale brownish ochreous, striped longitudinally with fine white lines, and copiously marked with short blackish streaks. Anterior and middle femora and tibiae striped longitudinally with whitish and dark brown lines, tarsi cream color with brown shading on one side. Posterior tibiae and tarsi cream color; spurs cream color tipped with brown.

Fore wings cleft about two-fifths, brownish gray, dusted with dark brown scales. There is an oblique brown patch at base of fissure, bordered posteriorly with white; a small brown spot midway between the last and base of wing, two longitudinal brown marks on the costa of first lobe and one or two brown dots on inner margin of the same lobe near the apex. Cilia of the fissure pale brown, at apex of second lobe whitish, on inner margin pale brown. Hind wings brownish cinereous with pale brown cilia. Under side of wings brownish cinereous, at the extremities of the lobes gray from admixture of white scales. Alar expanse 18 mil.

Described from one ♀ taken at Clifton, Texas, May 16, 1879, by G. W. Belfrage, to whom the species is respectfully dedicated.

TRICHOPTILUS OCHRODACTYLUS, n. s.

Head and palpi pale ochreous. Palpi cylindrical, extending horizontally beyond the head by about half its length, second joint somewhat thickened all around by raised scales, third joint rather stout, longer than the second joint, pointed. Antennae with a longitudinal brown line above, bordered by a fine white line on each side, beneath pale ochreous. Anterior part of thorax concolorous with head, posterior portion and abdomen light cream color, the latter nearly pure white beneath. Legs white, striped longitudinally with pale brownish ochreous; posterior tibiae with a band of raised ochreous scales before each pair of spurs; spurs brown on one side, white on the other.

Fore wings very narrow, cleft rather more than half, the anterior lobe tapering to a very fine point, posterior lobe linear, almost thread-like. Color pale ochreous, approaching to cream color, with a very slight brownish tinge on anterior lobe. A minute brown spot at base of anterior lobe reaches from base of fissure half-way to costa. Costal cilia of anterior lobe brownish ochreous, with a longitudinal white spot at the

basal third, another at the basal two-thirds, and a smaller one just before the apex. Cilia of fissure ochreous with a tinge of brown just beyond the middle and some white hairs near the apices. Cilia of inner margin pale ochreous, with a white patch at about the middle of posterior lobe, beyond rather dark brownish with a streaklet of white just before the apex. Hind wings brown, cilia slightly paler; third lobe on basal half pale brownish ochreous. On the inner margin of third lobe just behind the middle is a small patch of dark brown scales in the cilia, and from this to base of wing extends a row of slender club-shaped white scales. Under side of wings brownish ochreous. Alar expanse, 17 mil. Texas, G. W. Belfrage. Described from one example taken May 22, 1879.

NOTES ON A PARASITE OF PYRAMEIS CARDUI.

BY CAROLINE E. HEUSTIS, CARLETON, ST. JOHNS, N. B.

I send you a few specimens of an insect which I have found parasitic on the larvæ of *P. cardui*. For several successive summers I have reared a number of these caterpillars, with which our thistles in most seasons abound. I observed variations in size and color of the larvæ found feeding on the same plant, which led me to suppose that they might not belong to the same species. I have always observed that a large proportion were almost black, and much smaller than those from which I had obtained good specimens of *cardui*, but until the last summer my efforts to raise these were not attended with success, all the small black larvæ dying before they had attained their full growth, although they fed well for a time.

Last season I collected from a group of thistles of the same species fifteen caterpillars, and put them in breeding boxes. They all ate voraciously and one after another went into chrysalis, except two, which died on the bottom of the box, after having made several ineffectual efforts to suspend. Those which died were black. I carefully marked those which I supposed other than *cardui* as they suspended, and watched for the advent of the butterflies. I observed that the chrysalids of the black specimens were bright golden, and smaller than those of the bright and healthy-looking larvæ. The chrysalids of the latter were grey, ornamented with white stripes along the sides.

In due time two butterflies appeared from the striped chrysalids, and simultaneously with them a large ichneumon fly with bright blue wings and saffron body.* I felt some surprise at finding it in the box, and did not at first suspect where it came from; but when others appeared I examined the chrysalids and found several tenantless. Eight of the fifteen were infested. These flies are very sluggish, clinging closely to the sides of the box, and making no effort to fly unless disturbed.

LARVÆ OF CERÙRA OCCIDENTALIS LINT., AND C. BOREALIS, BD.

BY G. H. FRENCH, CARBONDALE, ILL.

During the past season I have had an opportunity of raising the larvæ of these two interesting species of insects, and as I do not know of any easily accessible description of either in the larval state, I give below the descriptions from my note book for the benefit of the readers of the ENTOMOLOGIST.

Cerura occidentalis.—Length when full grown 1.25 to the bifurcation of the anal segment. It is of nearly uniform size, a trifle enlarged anteriorly. In about the middle of the subdorsum of joint 1 is a prominent projection on each side, the body sloping from these down to the rather small head. There is but little sloping from these back to joint 9; from this there is a rapid sloping to the anal segment, this ending in two projections extensible at pleasure, instead of anal legs. When withdrawn these are a little more than a quarter of an inch, but may be extended to three-quarters. These are usually carried elevated backwards, but when extended are often thrown over the back as though used for defence. The general color is clear bright green, the sides spotted with clear purple brown, the spots round the stigmata and at the base of the legs and prolegs the largest. The back is marked with lilac, varying in shade and arranged as follows: From the two small contiguous tubercles on the back of joint 2 to the head is a somewhat diamond shaped space, the

* This insect has been kindly determined by E. T. Cresson, of Philadelphia, as *Ichneumon rufiventris*.—ED. C. E.

broadest part at the subdorsal tubercles on joint 1. From the tubercles on joint 1 to those on joint 2 the lilac is bordered by bright brownish purple with a white line outside of this. In the middle of this diamond is a little green shading. From the tubercles on joint 2 to the extremity of the body is another parti-colored space lighter than the anterior one. This gradually expands so as to include the stigmata on joint 7, then decreases in width to the anterior part of the anal segment, expanding a little in the middle of this, but contracting again at its posterior part. The lilac of this is like the first, considerably suffused with green on the back, and is bordered with brownish purple and white, though the colors are a little lighter posteriorly. These two dorsal patches are not continuous, but are separated on joint 2 by a distinct though small patch of green. The posterior projections are mostly brownish purple, though with somewhat greenish annulations, and when extended a ring of white near the extremity. Head dark lilac. The body is a little thicker vertically than from side to side.

These were found feeding on willows *(Salix nigra*, I think) from September 9th of last year to October 5th, nearly full grown. I noticed that previous to the last moult the tubercles on joint 1 were covered with little spines.

They were kept in a room of moderate temperature during the winter and transferred to the wood-house as soon as no more freezing was apprehended. The imagines began to appear April 30th, and the last emerged June 3rd.

Cerura borealis.—Of the same size, shape and general marking as the preceding. The head is brown. The sides of the body are yellowish green, the dorsal dark color not being so distinctly separated on joint 2 as in the first. The back, instead of being parti colored, is brown, somewhat suffused with green on the back at the widest places and darker along the edges. Previous to the last moult the sides are bright green and the brown a little less dull.

Two of these were found feeding on wild cherry the 17th and 18th of September, one nearly full grown which spun up Sept. 23rd. Only one produced an imago, and that emerged April 21st.

LIST OF N. AMERICAN SARCOPHAGIDÆ, EXAMINED BY R. H. MEADE, ESQ., BRADFORD, ENGLAND.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

The Deyrolle carton containing the specimens, which are in the same position as returned by Mr. Meade, bears the inscription by the Baron von Osten-Sacken: "This collection was arranged at my request by Mr. R. H. Meade, especially with a view of ascertaining whether any of the species are common to Europe and N. America." I have published this list for the same reason as the Anthomyidae. The division of the species is so far advanced that not much is left for the future monographer, except to draw up the descriptions and to name the species. Both are not done by myself for obvious reasons. The 27 species with 115 specimens are indeed all the contents of the collection of the Museum and those of the Baron. The Loew's collection contains about 24 species not labeled (except for the 3 species given) nor even arranged after the species. About half of them are from Cuba. My additions are given in [ ]; I have tried to compare the species as carefully as possible, but I should remark that the types of only 12 European species are at hand. Of the species are from N. England 13, from N. York 14, from Canada 7, from the Antilles 5.

SARCOPHAGA.

A. Anus red or yellow. (First division.)

B. No spines upon the second longitudinal veins.

C. Posterior tibiae of male bearded on their inner sides.

D. Second abdominal segment without central spines.

E. Thorax with four dorsal bristles behind suture.

Spec. 1. *S. aegra?* Walk.; does not correspond to any British species.

[8 specim. M., male and female, Cambridge, Mass., June 22; Catskill Mts., N. Y., July, 1874, O.S.; Denison, Craford Co., Iowa; Brit. Amer. In Loew's coll., 4 male and female, Ill.; Minn.; Wisc. Two types from Mo., labeled by O. S. *Sarcophaga sarraceniae* Riley, which have not been seen by Mr. Meade, are identical; the species was formerly believed to be *S. carnaria* Comstock's Rep. 1879, p. 304.]

E. Thorax with three dorsal bristles behind suture.

Spec. 2. Not like any British *Sarcophaga.*

[10 spec M., male and female. Cambridge and Dorchester, Mass.; Trenton Falls, July, O.S.; Long Island, O.S., July, Sept.; Manlius, Comstock, all N. York; Canada; Illinois. There are similar specimens in L. coll., but I am not sure of the identity.]

E. Thorax with only two large bristles behind suture.

Spec. 3. Seems identical with *S. nurus* Rond.

[11 spec. M., male and female, Cambridge, Mass.; N. York; Pennsylvania; Canada; Twin Lake, Color., Lieut. Carpenter. In Loew's coll. is at least one specimen labeled *S. dimidiata* from N. Y., bearing the same No., 325, with two seen by Mr. Meade. The number was used by O. S. to identify later specimens sent by him to Loew. One specimen seen by Mr. Meade from Mr. A. Agassiz' collection is labeled *S. georgiana*, and probably to be considered as the species mentioned by Th. W. Harris, as most of Mr. A.'s specimens were determined by him. I can not compare *S. nurus* Rond.]

Spec. 4. Very similar to *S. crustata* Meig.

[2 spec. M., male and female. Nahant, Mass. I cannot identify with them spec. in L. coll.]

Spec. 5. Similar to *S. nurus* Rond., only both anal segments red.

[3 spec., Cambridge, male; Cuba, Ch. Wright, female. In Loew's collect. 3, Distr. Columbia, a number from Cuba marked "viviparous, out of rotten land cray-fish," one fr. Bahia.]

Spec. 6. *S. Lherminieri?* R. Desv.

[One female, M. collect. on a voyage fr. Aspinwall to N. York by W. Holden; loc. incert.]

C. Posterior tibiae of male without beard.

D. Second abdominal segment with two central spines.

E. Thorax with four dorsal bristles behind suture.

Spec. 7. Differs from any British species.

[2 spec. M., one N. Conway, N. H., male, August 17, O. S.; the other marked "doubtful spec.," female, S. Franc., Cala., Holden. I am not able to see the two spines in the centre of the edge of the 2nd segment.]

E. Thorax with three dorsal bristles behind suture.

Spec. 8. Corresponds with *S. erythrura* Mgn.

[2 spec., male and female, M.. Cambridge, Mass.; Cayuga Lake, N. Y., Comstock, June 19.]

D. 3. Second abdominal segment without central spines.

E. Thorax with four bristles behind suture.

Spec. 9. Differs from any British species.

[25 spec. M., male and female. Cambridge, Mass.; Long Isl., N. Y., O S., Manlius, N. Y., Aug. 26, Sept. 28, Comstock, swept from grass, in woods; Fabyan's Nock., N. H., Sept., O. S.; Illinois, Allen; Brit. Amer, Scudd.; Huds. Bay Terr., Kennicott; Pacific Slope, Color., Lieut. Carpenter. In Loew's coll. fr. Illinois, Nebraska.]

Spec. 10. Not like any British species.

[2 spec. M., male and female, Long Island, N. Y.; O.S.]

E. Thorax with three bristles behind suture.

Spec. 11. Differs from all European species.

[7 spec. M., male and female, Cambridge, Mass.; Long Island, Cayuga Lake, May 25; Manlius Sept. 6, all N. Y.]

Spec. 12. Not like any British species.

[3 spec. M., male and female, Manlius, N. Y.; Maryland, Oct. 20; Grand Anse, Hayti, Uhler.]

Spec. 13. Very similar in structure to *S. haematodes* Meig.

[2 spec. M., female, Kentucky.]

E. Thorax with only two large bristles behind suture.

Spec. 14. Not like any British species.

[5 spec. male and female, Dorchester, Mass; Englewood, N. J.; South Park, Colorado; Grand Anse, Hayti.]

Spec. 15. Not like any British species.

[2 spec. M., male, Cuba; Distr. Columbia.]

B. Both second and fourth longitudinal veins of wings with spines.

D. Second abdominal segment without spines.

E. Thorax with four dorsal bristles behind suture.

Spec. 16. Differs from any British species.

[7 spec. M., male and female. Canada; Mass.; Long Island and Manlius, N. Y., end of August.]

E. Thorax with three dorsal bristles behind suture.

Spec. 17. Differs from any British species.

[9 spec. male and female. Cambridge, Mass.; Long Island, N. Y., O. S.; Grand Anse, Hayti, Uhler. The four larger specimens from

Cambridge and New York are *S. pachyprocta* Loew, var. *major;* the other ones from New York and Hayti are *S. pachyprocta* Loew, var. *minor.* The labels in Loew's handwriting are on the pins, and two corresponding specimens with the same numbers and labels in Loew's collection; there are specimens from Cuba and Pennsylvania in L. coll.]

Spec. 18. Not like any British species.

[1 spec. M.; Manlius, N. Y., Aug. 18, Comstock.]

A. Anus black or gray. (Second division.)

B. Second longitudinal veins of wings spineless.

C. Posterior tibiæ of male bearded.

E. Thorax with four dorsal bristles behind suture.

D. Second abdominal segment without central spines.

Spec. 19. Closely resembles *S. similis* Mihi.

[3 spec. M. male and female, Lake Superior, Agassiz; South Park, Color., Lieut. Carpenter. See about this species O. S. Catalogue, p. 257: "I am doubtful whether any of the N. Am. species is absolutely identical with *S. carnaria*, unless it be with *S. similis*, etc." Mr. Meade.

E. Thorax with three bristles behind suture.

Spec. 20. Very similar to female of *S. albiceps* or *S. atropos.*

[1 spec. M., Detroit, Mich., June 3, Hubbard.]

C. Posterior tibiæ of male smooth.

D. Second abdominal segment with two central spines.

Spec. 21. Corresponds closely with *S. juvenis* Rond.

[2 spec., male and female, M.; Manlius, N.Y., Aug. 12, Comstock; Detroit, Mich., July, Hubbard.]

Spec. 22. Corresponds closely with *S. nigriventris* Meig.

[1 spec. M., Sturgeon Isl.; Brit. Amer.; N. Red River; Scudder.]

Spec. 23. Not like any British species.

[1 spec., Cambridge, Mass.]

Genus *Phrissopoda* (Peskia Desv., Meade.)

Spec. 24. *imperialis?* Desv.

[1 spec. M., Cuba; some spec. in L. coll.]

Gen. *Cynomyia* Desv.

Spec. 25. Spec. uncertain.

[1 spec. M., Fabyan House, N. Hampsh. O.S.]

Gen. *Theria* Desv.

Spec. 26, 27; can not name the two species.

[6 spec.; all N. York, Manlius, Aug. 21-27, Sept. 6; Cayuga Lake, June 19; Comstock.]

Family Tachinidae.

Sectio. Phasina.

Gen. *Xysta* Meig.

Spec. 28. One female spec., N. Hampsh.

[This specimen is different from the type of *X. didyma* Loew. The type described was a male from Illinois; the only male in L. coll. with label on the pin has a white square label with an R., similar to those with green square label from Red River of the North. Besides stands a female from Texas, less than half as large; perhaps not belonging here.]

Family Dexidae.

Gen. *Prosena.*

Spec. 29. One spec. from Cuba. [Differs from Loew's type, *P. mexicana.*]

Genus *Miltogramma* Meig.

Spec. 30. [There are 5 spec. from Cambridge and Dorchester, Mass.; Trenton Falls, N. Y.; Colorado Mts., Carpenter; probably belonging to different species.]

Spec. 31. [*Sarcophaga nudipennis* Loew.; bred from mud cells of *Pelopaeus* by W. H. Patton, Waterbury, Conn., Aug. 24; see Packard's Guide p. 408. One of the spec. by Mr. Meade labeled *Miltogramma* Meig., the other one *Miltogramma?* Meig. There are in Loew's two spec. with corresponding number, and label in his handwriting.

ON SIMULIUM.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

I have received from Mr. H. G. Hubbard some larvæ and pupæ, with the case, labeled as follows: "The *Simulium* larvæ and pupæ were collected on the rocks at the foot of the falls of Michipicotin River, Lake Superior, in shallow pools and gutters of rapid water. There were large patches of rock surface densely covered with either the larvæ or pupæ, so

closely packed as to resemble a growth of aquatic vegetation. The black flies were very abundant in the woods."

The pouch or case is similar to that described by me for *S. pictipes*. The nymphae and larvae seem to be the same, but that the pupa has on each side nine filaments instead of eight, as stated for *S. pictipes*. I made a new examination of my material and found this number variable, without possibility to ascertain that one filament is broken off. I see nymphae with eight or with nine filaments on both sides, and have ascertained in one specimen nine on one side and eight on the other. I think more material is needed to decide if one filament in such cases is perhaps wanting as a consequence of a previous mutilation. The flies sent by Mr. Hubbard, without certainty to belong to the pupae, are only half the size of *S. pictipes*, and differ in the color of the legs. But the few specimens of *S. pictipes* which I have seen are newly hatched and in alcohol. The flies sent by Mr. Hubbard are considerably smaller than those described by Mr. Barnard, and differ also by the color of the legs. (Amer. Entom. iii., No. 12.)

To prevent later uncertainty about the types of *Simulium* in the collections of the Museum, I have to state that the collection of O. Sacken contains named only *S. vittatum*, and the collection of Loew only *S. venustum* and *S. quadrivittatum*. *S. invenustum* and *piscioidium*, though starred in the catalogue of O. S., have not been found in his collection. There is without name only one specimen from Hudson's B. Terr. (none in Loew's), and no specimens from Mumford, N. Y. Only two later collected from Goat Isl., and one labeled by myself from Trenton Falls. Loew's collection has no species from N. Y. In both collections are a number of unnamed specimens, and Mr. Hubbard's species seems to agree with one from the Saskatchewan River.

LIST OF NORTH AMERICAN BOMBYCLE OF HUBNER.

BY A. R. GROTE.

Since I first catalogued our species of *Bombyciæ*, under Herrich-Schæffer's later designation of *Cymatophorinæ*, in the Proc. of the Entomological Society of Philadelphia for May, 1863, there have been but few additions to the group. Nor have the then debatable points been settled

The validity of *expultrix* as a "species" is still doubtful. I have taken a considerable number of both sexes of *expultrix* and *cymatophoroides*, and while the latter show a considerable variation in the distinctness of the finer markings of the fore wings and in the depth of ground color, the specimens of the former remain always nearly alike and uniform, and never show the black lines of the typical *cymatophoroides*. Notwithstanding I am inclined to revert to my original opinion that the two are but forms of one species. Since 1863 the typical genus of the group has been discovered in this country. Both the described species of *Bombycia* are from the Pacific Coast, and are additional examples of the resemblance of our Western fauna with that of Europe. Of one, *semicircularis*, I have seen only the female; in the smooth abdomen with its single dorsal tuft and the basal patch on primaries it resembles *Thyatira*. In ornamentation and cut of wings it is like *improvisa* and the European species.

In the present list I leave the genera as formerly recognised, but I am aware that they need more careful study. This cannot be undertaken until fuller material from the Pacific is received. Mr. Hy. Edwards reports *expultrix* from British Columbia; if this locality is correct we have a wide range for this species. I suspect that under the name *derasa*, the same author reports *scripta* from Alaska and Victoria. The members of this group seem single brooded, and in New York I have taken *scripta* and the two forms of *Pseudothyatira* in May and June at sugar. The larvæ await discovery and description.

LEPTINA. *Guenée.*

dormitans *Guen.*, R. I.; N. Y.

ophthalmica *Guen.*, Wisc.; N. Y.; Mass.

Var. australis. Texas; Alabama.

This form is narrower winged and the markings are more effaced than the type. The black curved mark inaugurating the s. t. line in the type is here straighter, shorter, in one specimen thicker. The black marks at internal margin of the same line are disconnected dashes; the line itself is interrupted. The basal patch is whitish. This is not improbably a distinct form, but the variations of the species of *Leptina* are not understood.

latebricola *Grote.* Wisc.; N. J.

N. B.—I have only seen one more specimen than my type, which latter is in Coll. Ent. Soc. Phil., and which I have not been able to compare since describing it.

Doubledayi *Guen.*, Mass. (in July); N. Y.; Penn.

BOMBYCIA Hubn.

improvisa *Hy. Edw.* Wash. Territory.
semicircularis *Grote.* Wash. Territory.

N. B.—Mr. Walker describes a "*Cymatophora caniplaga*" from Canada; I do not know it and the type must be examined to see if it belongs here.

THYATIRA Ochs.

lorata *Grote.* Wash. Territory.
pudens *Guen.* Anticosti; Can. to Penn.

PSEUDOTHYATIRA Grote.

cymatophoroides *Guen.* Can. to Penn.
expultrix *Grote.* Same localities, also B. Col. (teste Hy. Edw.)

HABROSYNE Hubn.

scripta *Gosse; abrasa* Guen., Alaska?; Victoria? *(derasa* Hy. Edw.) Canada to Pennsylvania.

N. B.—This species is very near the European *derasa*, but is considered distinct from a comparison of the imago by Gosse and Gueneé. I have given the differences as they appear to me (Proc. Ent. Soc. Phil., 2, 58). It seems to me better where differences occur to keep distinct names for these "representative species" or "geographical varieties." They are connected with the series of distinct species by forms differing more or less notably, and in this case it is difficult to decide where the "species" commences and the "variety" ends. But it is quite unexact to lump species in the moths as has lately been attempted in the pages of the Brooklyn Ent. Society's periodical, without exact information and merely on the general principle that there are too many "species" in our lists. This may indeed be the case, but the way to prove it does not lie in slurring over noted characters or quoting opinions which do not rest on solid foundation. More confusion is created by throwing together distinct forms under one name than in keeping varieties under specific titles.

MEETING OF THE ENTOMOLOGICAL CLUB OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The Entomological Club of the American Association for the Advancement of Science was formed last year into the Entomological Sub-Section of Section B of the A. A. A. S., and will therefore hold no separate meetings hereafter. It will meet with the Association at Cincinnati, Ohio, on Wednesday, 17th August, 1881, at 10 a. m. All persons interested are invited to attend its meetings and participate in its discussions.

B. Pickman Mann, Secretary. Jno. G. Morris, President.

ON THE APHIDIDÆ OF FLORIDA, WITH DESCRIPTIONS OF NEW SPECIES.

(Paper No. 1.)

BY WM. H. ASHMEAD, JACKSONVILLE, FLA.

In the April number of the Canadian Entomologist I described a new Aphis affecting *Pinus australis* belonging to the Section *Lachnini.*

Having been studying the Aphididae of Florida for the past two years, a quantity of new material has accumulated on my hands, representing nearly all the known North American genera.

This I now propose bringing to the notice of the Entomological world, at the same time giving a list of all the known North American species in a series of short papers, through the columns of the Can. Ent.

I desire to express my thanks to my friend, Mr. Allen H. Curtiss, of this city, and to Dr. A. W. Chapman, of Apalachicola, for assistance in determining the plants upon which these feed. In classification I shall follow Prof. Cyrus Thomas.

Section Lachnini.

Genus *Lachnus*, Illiger.

The species of this genus already described from North America are as follows :

1. L. salicicola, Uhler.
   Syn. Aphis salicti, Harris.
2. L. dentatus, LeBaron.
3. L. caryae, Harris.
4. L. strobi, Fitch.
5. L. laricifex, Fitch.
6. L. abietis, Fitch.
7. L. alnifoliae, Fitch.
8. L. quercifoliae, Fitch.
9. L. salicelis, Fitch.
10. L. longistigma, Monell.
11. L. australi, Ashmead.

To these I add the following :

12. LACHNUS QUERCICOLENS, n. sp.

Wingless female.—Length .05 inch. Ovate. Reddish, becoming brown with age. Vertex of head brown ; beak reaching to middle coxae, reddish at base, yellowish in middle and brown at tip ; antennae 7-jointed, reaching to honey tubes, whitish, basal joint reddish, joints annulated at tip with black, apical joint short, black ; honey tubes almost obsolete, as wide as long, whitish ; style hardly visible, whitish, pubescent ; legs pubescent, posterior pair dark brown or black, middle and anterior pair reddish yellow, feet infuscated.

Winged individual.—Length .05 inch. Same as apterous female excepting abdomen is lighter in color, middle femora and coxae dark brown, and wings hyaline, with the stigma and veins green.

This species was found early in February, feeding on the under surface of the leaves of the live oak, *Quercus virens*. Winged specimens, however, were not taken until April.

Genus *Phyllaphis*, Koch.

The only species so far known belonging to this genus is

1. Phyllaphis fagi, Linn.

To this I now add

2. PHYLLAPHIS NIGER, n. sp.

Wingless female.—Length .05 inch. Ovate and of a shining black color. Head broad, nearly as long as wide, slightly arcuate in front and with two longitudinal depressions on vertex.

Beak long, reaching beyond hind coxæ, black at base, but becoming reddish towards tip and slightly pubescent ; antennae 7-jointed, situated very widely apart and not on tubercles, brownish in color with the terminal joint very minute ; metathorax a broad, smooth, shining, convex plate ; abdomen wider than long, sides flattened to honey tubes, slightly pubescent ; honey tubes black, almost obsolete, as wide as long ; style not visible, anus pubescent ; legs dark brown, approaching black, pubescent, posterior pair long.

This, in some respects anomalous Aphis, was detected feeding on a tender shoot of the willow oak, *Quercus phellos*, variety *laurifolia*. No winged specimens could be found.

The broad head, slightly pubescent abdomen and other characters would seem to exclude it from the genus *Lachnus*. I have therefore placed it provisionally in *Phyllaphis* genus, to which it seems most closely allied.

DESCRIPTION OF A NEW SPECIES OF TROCHILIUM.

BY HERMAN STRECKER.

Trochilium Grande, n. sp.—General appearance of *T. Ceto (Melittia Cucurbitæ* Harr.) but very much larger, expanding 1¾ inches.

Antennæ blackish. Palpi reddish orange. Head white in front, dark lustrous greenish gray on top. Collar red. Thorax above dark greenish same as top of head. Abdomen red, each segment outwardly edged with black. Beneath whole body reddish orange: on the abdomen a row of black ventral spots. Posterior legs heavily clothed with red hair, accompanied by a narrow ridge of black, above, towards the abdomen; tibial spurs black edged with white hair inwardly. Fore and middle legs red, tarsi black and white ringed.

Primaries. Upper surface same dark silky gray as back of thorax. Secondaries transparent, broadly fringed on exterior edge with same color as primaries; some orange hairs at abdominal margin and base of wing.

Under surface. Primaries shining orange red shading somewhat into gray towards exterior margin. Fringe gray. Secondaries as on upper surface, but with some red scales along costa. ♂

Hab. Texas.

Allied to *Desmopoda Bombiformis*, Feld., *Trochilium Astarte*, Westw., but still more closely to our smaller indigenous species *T. Ceto*, above alluded to, and to a species from Mexico lately described by Hy. Edwards as *Melittia Gloriosa*; this latter differs from all those mentioned in having opaque hind wings.

As the description of Hübner's genus Melittia, in which the Americans place *Ceto*, is much too vague and uncertain ("The fore wings partly, the hind wings entirely transparent; the feet very thickly haired.") I have preferred to adopt Prof. Westwood's infinitely better determined genus *Trochilium*.

May 4th, 1881.

The Canadian Entomologist.

VOL. XIII. LONDON, ONT., AUGUST, 1881. No. 8

NOTES ON AEGERIA PINI.

BY D. S. KELLICOTT, BUFFALO, N. Y.

The description of this moth on page 7 of this volume was drawn from a single female specimen and that not in good condition. I have this season secured fresh examples of both sexes; from these I note some additions and corrections to the previous account.

The male is smaller than the female but of similar ornamentation. The antennæ are fimbricate; the hoary hairs towards the base are nearly equal in length to the diameter of the joint on which they stand. The fourth abdominal ring bears an orange band on the posterior half in the female; it occupies nearly the entire width of the ring in the male. The black of the upper side of the abdomen is continued in the tail fringe. As regards the color of the head, the vertex in one female was black, in one black with a few orange hairs, in another the orange equals the black; it is orange in all the males seen; the under side of first joint of palpi is orange. There are a few orange scales on the coxæ of the first pair, and an oblique tuft of same color on inner side of fore tibiæ; these marks occur in both sexes. In some examples there are a few orange scales or hairs on top of thorax, especially on the inner edge of shoulder covers.

It seems worthy of note that the specimens hatching in confinement, and so not having used their wings in flight, have the hind wings sparsely covered with scales, as in the case of the newly hatched *sesia*. These scales fall off easily, but appear to be retained more firmly than in the former cases with which I am acquainted. An apparently full grown larva brought in July 15, 1880, gave a pupa May 19 and an imago July 2, from which I conclude that the larva does not transform until two years old. The moths appeared ten days later in 1880 than in 1881.

DESCRIPTION OF PREPARATORY STAGES OF HELICONIA CHARITONIA, Linn.

BY W. H. EDWARDS, COALBURGH, W. VA.

Egg—Cylindrical, one half higher than broad, flat at base, tapering very slightly from base to about three fourths the length, then conoidal, the top flattened and a little depressed; marked by 14 vertical ridges, straight, narrow, not very prominent, and extending from base to the middle of the cone; below the cone are horizontal striæ, which with the ridges enclose long, rectangular spaces; there are nine tiers of these, each space roundly excavated; above the base of the cone are similar spaces in one tier, but they are higher and more nearly square and more deeply excavated; next these is a tier of seven cells, irregularly pentagonal; the flattened top is composed of three concentric rows of small spaces, the outer one largest, and this and the next formed of pentagons; the inner row is made of rhomboids with the micropyle in the centre; color yellow. Duration of this stage 3 days.

Young Larva—Length .08 inch; cylindrical, segments 2 to 7 of about even thickness, then tapering, the dorsum sloping; marked by six rows of rounded tubercles, each of which sends out a long black hair, those on three anterior segments bent forwards, the others back; there is also a minute tubercle at the junctions of the segments a little below the subdorsal row, with short hairs; color pale red-brown; legs and feet same; head obovoid, a little lighter in hue than the body; sparsely pilose. To 1st moult 2 to 3 days.

After 1st Moult—Length .22 inch; cylindrical, nearly even, the segments a little rounded; color light brown, changing, as the stage proceeds, to greenish-white, mottled with brown; armed with six rows of spines, two sub-dorsal, one on middle of each side, and one infra-stigmatal; these spines are short, slender, tapering, black, with a few short black bristles on the sides standing almost at right angles to the spine; on 2 a chitinous dorsal patch with hairs; feet and legs brown; head obovoid, truncated, a little depressed at the suture, the vertices low, rounded, and on each a short, tapering blunt process, black, with a few fine bristles. To next moult 2 days.

After 2nd Moult—Length .5 inch; color dull white, mottled or

spotted with yellow-brown; under side wholly brown; the spines long, sharp; head as before. To next moult 2 days.

After 3rd Moult.—Length .7 inch; slender, whiter than before, the color not pure but with a green tint; dorsal spines .1 inch long, upper laterals .09 inch, lower laterals .07 inch; head greenish-yellow, the processes more like the body spines, .08 inch long, directed forward and a little recurved. To next moult 3 days.

After 4th Moult—Length 1 inch, and in 3 days reached maturity.

Mature Larva.—Length 1.25 to 1.5 inch; cylindrical, slender, nearly of even size from 2 to 12, the segments a little rounded; color dead white, with no gloss, smooth, with no hairs; spotted with black or black-brown, the spots disposed in cross rows, two of which are back of the spines and one on the extreme anterior end of the segment; mostly rounded or oval, but those on medio-dorsal line are half-oval except the spots on the posterior edges of the segments, which are triangular; these spots form one dorsal row and two on either side; over the basal ridge, on 4 to 11, is a brown patch covering the adjacent edges of the segments; another patch covers each spiracle; under side reddish-brown with a green tint; segment 2 has a dorsal chitinous bar divided in middle, and on either part are two black tubercles with hairs; the body furnished with six rows of spines, two sub-dorsal, one on middle of each side, and one infra-stigmatal; the dorsals run from 3 to 13; the upper laterals from 5 to 13, the lower from 5 to 12; and between 2 and 3, 3 and 4, in line with upper laterals, is a spine; the spines of the four upper rows are straight and erect, but those of the lower row are turned down and a little recurved; all are alike, shining black, and about each are from 5 to 7 short black bristles irregularly placed; the dorsals measure .16 inch, the 1st laterals .14, the lower 1 inch, and there is little variation in the length of the spines of each row; legs brown, tipped black, pro-legs brown, with a black spot on the side of each; head obovoid, rounded in front, truncated, a little depressed at the suture, the vertices but little elevated, rounded; color greenish-white, vitreous; on either side the suture on mid-front a round black spot; the ocelli black on a small black patch; mandibles black; on each vertex a black spine nearly like those of the body, but less tapering and more blunt, .1 inch long, directed forward at about 45°, and a little recurved.

As the larvæ approach suspension the spots change to brown, and the

white becomes dull and sordid. Twelve hours after suspension, pupation takes place.

Chrysalis—Length to top of head .95 inch, to end of processes on head 1.1 inch; slender, compressed laterally, the thoracic segments on ventral side highly arched and rounded abruptly down to abdomen; the sides of this elevation covered entirely by the wing cases, sloping, almost flat or a little convex, the two wing cases not quite meeting, but separated by a narrow depressed ridge, on either side of which is a row of small bead-like tubercles, each giving out at top a short sharp bristle or thorn; this ridge widens anteriorly so as to include the antennæ cases, and the rows of beads pass along and around head case to its top on the dorsal side, but for a little distance at the base of the antennæ lose their bristles; head case prominent, compressed transversely, nearly square at top; upon each vertex a narrow leaf-like process, lanceolate, flattened and thin, serrated on both edges, divergent, like horns; mesonotum prominent, compressed at top into a thin carina which rises on the anterior part in a double curve to a sharp point, but on the posterior side slopes at about 45°; followed by a rounded excavation considerably longer than the mesonotum itself; abdomen cylindrical; on the two upper segments a large sub-dorsal, flaring, flattened process rounded irregularly on the edge and completely spanning both segments; on the next segment is a small sharp rounded process, and on the next another small and flattened; on the next a sharp tubercle, in some cases flattened; on the tops of all these processes are thorns, one on each of the smaller, and two on the largest; in row with these, on the depression and on the sides of mesonotum are four low conical tubercles, each with a short thorn; segments 9, 10, 11, in the ventral line, have the anterior edges turned up and produced into low divergent points; at the base of the head case on dorsal side a large burnished gold spot, and the tubercles behind the mesonotum are similar to this in color; general hue brown, in shades; the anterior parts, which includes head case, mesonotum and half the wing cases, being light or yellowish; the rest of wing cases dark, or streaked dark in the interspaces of the wings; the light part of these cases somewhat gray or whitish; the processes on head and the antennæ cases are dark; abdomen varied in longitudinal streaks, confined to each segment, dark and light brown, with some oblique whitish marks on the ventral side. Duration of this stage 6 to 7 days.

This species is common in Southern Florida, and has been taken at

least as far north as Port Royal, S. C., from which place I have seen an example. It is a tropical species, however, and abounds in Central America and the Antilles. By the kindness of Dr. Wm. Wittfeld, of Indian River, eggs were obtained by tying the females in bags over stems of Passiflora, and after several failures, owing to delays on the journey, I received 30th Aug., 1880, larvæ of different sizes. The eggs had been mailed very soon after laying, and the larvæ had hatched on the road. I gave them Passiflora coerulea. All the changes take place with great rapidity, scarcely two days being necessary for each larval stage. When mature, being porcelain-white, with their long black body and head spines, they are conspicuous objects, and very pretty ones. They move about actively, and in habit and general appearance—except color—remind one of Agraulis *Vanillae*. Dr. Wittfeld informs me that on touching the chrysalis of *Charitonia*, it wriggles about and gives out a perceptible creaking noise, but I had not observed this with my chrysalids.* The chrysalis is a most remarkable object, from its general shape and the thorny flattened projections on the abdomen, and the foliaceous processes on the head.

Several imagos came forth in my room and one of them I turned loose in the garden, placing it carefully upon a Passion flower. It rested some moments, with wings fully expanded over the flower and depressed a little below horizontal, and then flew slowly away toward the woods and I saw it no more.

Dr. Wittfeld informs me that these butterflies frequent paths in the woods, or are found feeding at a little distance from the woods, to which they at once betake themselves, if alarmed, and that with rapid wing, though usually their flight is rather heavy and measured. Also that they have the habit of gathering in flocks towards night and roost on Spanish moss, and on dry twigs of trees, especially such as have dead leaves still hanging to them. He has seen them so roosting, always with heads up, to number of 50 or 60. In the morning, after the sun is well up, they come trooping from the woods in search of flowers.

* In Part II of Dr. Weismann's Studies in the Theory of Descent, Lond. con. 1881, is an abstract of a paper by Dr. Fritz Müller, on Brazilian butterflies, in which it is stated that "the pupæ of Heliconius when moving their posterior segments rapidly, as they do whenever they are disturbed, produce a very perceptible hissing noise by the friction of these segments, this sound perhaps serving to terrify small foes."

Mr. Thaxter has described Danais *Archippus* as flocking in this manner, in Florida, but this seems to be a habit at certain seasons, during the day as well as night. *Charitonia* would seem to roost in crowds at night only, and to disperse during the day for feeding, like so many pigeons. I find nothing of this in books, nor have I been able to find that any of the preparatory stages of this species have been figured or even described by authors. I have a complete set of drawings of the egg, larva at each stage, and chrysalis, and shall in due time give a Plate to them in Butterflies of N. A.

INSECTS OF THE NORTHERN PARTS OF BRITISH AMERICA.

COMPILED BY REV. C. J. S. BETHUNE, M. A.

From Kirby's Fauna Boreali-Americana: Insecta.

(Continued from Vol. xi., p. 154.)

FAMILY NOCTUIDÆ.

429. PLUSIA RECTANGULA *Kirby*.—Expansion of wings 1½ inch. Taken in Canada by Dr. Bigsby.

Body cinereous, underneath whiter. Antennæ testaceous; thorax crested? as the scales are mostly rubbed off this cannot however be positively asserted; wings incumbent; primaries with a subcrenate edge; inclining to ash-colored, clouded with black, with a subramose rectangular somewhat silvery spot, extending from near the base to the middle of the wing; between which and the apex is a narrow white wavy band, edged with black; and still nearer the margin a zigzag transverse black line; the secondary wings are plicatile, cinereous, and dusted at the apex with brown.

N. B. The silvery rectangular spot in the primary wings of this insect, when they are brought near to each other, forms a quadrangular area very much resembling a picture in a silver frame.

[307.] 430. PLUSIA GAMMA *Linn.*—Expansion of the wings 1½ inch. Taken in Canada by Dr. Bigsby.

Head, crests of the thorax and abdomen gray; these crests are edged with white and in the anterior ones the margin is formed by a black and white line; abdomen cinereous; antennæ above testaceous, underneath white banded with brown; the primary wings are shaded and clouded with black, brown and white, and towards the apex have three indistinct bands, the first white internally abbreviated, the second dark-brown, and the marginal one gray including a transverse series of black crescents; in the disk of the wing is a pallid silvery signature, representing the Greek letter gamma, or the Roman Y, the forked part pointing to the costal margin; from the upper point of the fork a white curving line runs obliquely to the anal margin of the wing near its base; secondary wings light brown, or drab, with the nervures, and posterior margin broadly, dark-brown; fringe alternately dark and light; underneath the wings are cinereous, darker at the apex.

[308.] 431. PLUSIA FALCIFERA *Kirby*.—Expansion of the wings 1½ inch. Taken in Nova Scotia by Dr. Mac Culloch.

Body gray. Antennæ and thorax, when laid bare, testaceous; primary wings gray with a faint reddish tint, a broad brown spot, or cloud, almost triangular, traverses the middle of the wing, which partly includes, and is partly edged, by a sickle-shaped silvery streak; the part representing the handle of the sickle being broader than the rest, and sending forth externally near its apex a short branch, which, with the internal apex of the handle, forms a fork; the inner tine, or branch, of which terminates in a slender line running in a curve to the costal margin, where it touches the scutellum; a brown indistinct cloud, or band, also runs obliquely from the anal to the apical angle of the wing; a very minute, pale streak marks it just transversely above the former angle; the posterior margin is slightly indented; the secondary wings are reddish-brown, with an obsolete, pale, submarginal band.

432. PLUSIA IOTA *Linn.*—Expansion of wings 1¾ inch. Taken in Nova Scotia by Dr. Mac Culloch and in Canada by Dr. Bigsby.

[309.] Body, legs and antennæ fawn-colored, as are likewise the paler parts of the wings; primaries clouded and streaked with dark, and reddish-brown; the disk of these wings is occupied by a large cloud of this color inscribed with two, sometimes silvery, and sometimes golden, brilliant metallic spots, tending to form an obtuse angle with each other; the upper one, or that nearest the base of the wing being acuminated towards that

part, rounded towards the apex, and sending forth two branches towards the costal area; the lower spot is subtriangular or V-shaped, with the point towards the base of the wings; the two together form, in some sort, a semicolon reversed; between the lower or ovate spot and the costa is a rather indistinct circlet of gold or silver, and two streaks of the same lustre may be traced lower down between it and the inner margin of the wing; the disk near the apex is bronzed; from the brown cloud mentioned above runs a wavy brown streak to the external apical angle, the apex itself is terminated by a band formed by indistinct black crescents; and above the streak is a transverse band formed by two faint lines of dark indistinct crescents including a pale band; secondary wings darker at the apex.

N. B. In the Nova Scotia specimens the discoidal spots are silvery, while in that from Canada their lustre is golden. The synonymy of this species seems very doubtful; the metallic signature can scarcely be said to represent either a mark of interrogation, or a Greek Iota reversed; they most resemble a semicolon.

IX.—DIPTERA.

FAMILY CULICIDÆ.

433. CULEX PUNCTOR *Kirby*.—Length of body 3⅓ lines. Two specimens taken in Lat. 65°.

Body black. Proboscis longer than the trunk; sheath black; valvules and lancets testaceous; palpi somewhat incrassated towards the apex; antennæ broken off in both specimens; wings white, iridescent, with testaceous nervures, without scales, hairs and fringe; legs testaceous.

[310.] FAMILY TIPULIDÆ.

434. TIPULA PRATORUM *Kirby*.—Length of body 7 lines. Taken with the preceding.

♂. Head and trunk slate-colored. Antennæ black, with the scape yellow; thorax with four brown stripes, the lateral ones abbreviated; wings embrowned, clouded with white; nervures black, but those at the base of the wing are testaceous; there is a black dot or two near the anterior margin; and the stigma, or what represents it, is black; the poisers are pale but black at the tip; legs obscurely testaceous; thighs

and shanks black at the tip ; tarsi black : abdomen clubbed, yellow, with a longitudinal dorsal brown stripe ; anal club black.

♀. Wings not spotted with white ; legs distinctly testaceous, black at the joints ; last joints of the tarsi black : abdomen lanceolate, yellow, with a dorsal, ventral, and on each side a lateral, brown stripe.

FAMILY BIBIONIDÆ.

[311.] 435. ASPITES (ARTHRIA) ANALIS *Kirby*.—Plate vi., fig. 8.—Length of body, excluding wings, 2 lines ; including wings, 3 lines. Several taken in Lat. 65°.

Body black, naked. Head very small ; trunk with a dorsal area marked out by a ridge ; on each side is a reddish-yellow line drawn from the collar to the base of the wing ; but in some specimens this is very indistinct ; poisers white : wings hyaline, iridescent, much longer than the body ; costal area divided into three areolets, with testaceous nervures, terminating in a black stigma ; there are four spurious nervures, the first abbreviated, and the anal one bent towards the margin ; the legs are reddish-yellow except the apex of the tarsi, which is black ; the intermediate pair are smaller and shorter than the others ; anterior thighs are much incrassated, and the tibiæ terminate in a spine ; the posterior thighs are elongated ; abdomen flat above : anus yellow, as is sometimes the margin of the ventral segments.

FAMILY EMPIDÆ.

436. EMPIS LUCTUOSA *Kirby*.—Length of body, including wings, 3 lines. Taken with the preceding.

Body entirely black. Proboscis very little longer than the head ; wings a little embrowned, with a large black stigma, iridescent, nervures black.

[312.] 437. EMPIS GENICULATA *Kirby*.—Length of body 3 lines. Taken with the preceding.

Very similar to the preceding, but not so black ; wings slightly embrowned, beautifully iridescent ; legs, where the shank is united to the thigh, white ; proboscis nearly as long as the thorax.

FAMILY BOMBYLIADÆ.

438. BOMBYLIUS MAJOR *Linn.*—Length of body, including proboscis, 7 lines; excluding do., 5 lines. Expansion of wings 1 in. to ¾ inch. Taken in Lat. 65°.

[313.] Body black, thickly covered above with yellowish, soft, but erect hairs; underneath the hairs are whiter, but those on the breast, at the origin of the legs, are black; wings with the anterior half longitudinally black-brown, the dark color on the inner side being sinuated or uneven; the posterior half of the wings is transparent with black nervures; the legs are long, and pale-yellow; but the tarsi are reddish-black at the extremity; the eyes are triangular.

[This species is taken in Europe, and in N. America in Nova Scotia, New York, &c.]

439. BOMBYLIUS PYGMÆUS *Fabr.*—Length of body, including proboscis, 5 lines; excluding do., 3 lines; expansion of wings 9 lines. Taken with the preceding.

Body black, hairy. Hair below the eyes black; eyes meeting at the vertex; behind the eyes the hairs are gray; those on the thorax are tawny or reddish with a white tuft on each side at the anterior and posterior margin; the wings are longitudinally dusky at the anterior margin; more than the posterior half is hyaline, with several scattered black dots, the interior ones being the largest; the legs are testaceous, but black at the tip; the abdomen is covered by reddish hairs with dark ones intermingled; those at the anus are whitish.

[Taken in various localities throughout N. America.]

FAMILY TABANIDÆ.

440. TABANUS AFFINIS *Kirby.*—Length of body 7¾ lines. Taken with the preceding.

[314.] Body black with hoary down. Proboscis, palpi, and base of the antennæ obscurely, all red; down on the trunk very thin, mixed with a few black hairs; tubercles before the wings, winglets and knob of the poisers, pale testaceous; legs black with the four posterior tibiæ rufous; wings embrowned, with darker nervures; three first segments of the abdo-

men rufous, each with a black dorsal spot ; margin of the segments pale with a whitish fringe ; the fourth segment has a pair of round, red, dorsal spots.

Variety B. Antennæ all black.

441. Tabanus zonalis *Kirby*.—Length of body 7½ lines. Taken with the preceding.

Body black, with a few hairs of the same color, especially at the sides of the trunk. Antennæ reddish at the base ; sheath of the proboscis, and palpi, black ; haustellum testaceous ; breast whitish from inconspicuous down ; tubercles before the wings subferruginous ; wings subtestaceous with some of the nervures black ; knob of the poisers reddish ; thighs black, reddish at the tip ; tibiæ, and tarsi, except the anterior pair, which are black, as well as the apex of the anterior tibiæ, red ; abdominal segments above and below margined with white decumbent down and fringe.

442. Chrysops sepulchralis *Fabr.*—Length of body 6 lines. Taken with the preceding.

[315.] Body black, slightly downy. Head hoary from pubescence ; proboscis with a black sheath and testaceous haustellum ; feelers black ; antennæ red at the base ; below the antennæ is an obtriangular levigated, and naked space, with rounded angles, and somewhat elevated ; behind the antennæ in the frontal space, between the eyes, the ordinary levigated and naked areas, which in *Tabanus* are longitudinal, in *Chrysops* are transverse ; sides of the trunk hairy with black erect hairs, it is also marked above with four longitudinal hoary stripes formed by invisible pubescence ; underneath the trunk is covered with down of the same description and color, and set with tufts of longer hairs ; wings white, with the costal margin and a middle abbreviated band, and nervures brown ; legs and abdomen black, and extremity whitish from down.

[An European species.]

FAMILY SYRPHIDÆ.

443. Scæva ribesii *Fabr.*—Length of body 4 lines. Taken with the preceding.

Head concavo-convex ; underneath black, with the edge fringed with whitish hairs ; vertex black ; face below the antennæ yellowish ; hoary

from decumbent hairs next the eyes; antennæ yellowish with a darker cloud; trunk bronzed with a greenish tint, downy especially on the sides, down whitish; wings hyaline, longer than the body, with black nervures, but those of the costal area are ferruginous; scutellum large, yellow; legs luteous, coxæ and trochanters dark-brown, posterior tarsi black, first joint below with a brush of golden colored bristles; abdomen depressed, above black with five yellow bands, viz, one consisting of two crescents, forming an interrupted band, [316] traversing the middle of the first segment; then a broadish subinterrupted one traversing the base of the second and third; and lastly the margin of the two last segments is also yellow, as is the under side of the abdomen.

[An European species; taken also in Nova Scotia.]

FAMILY MUSCIDÆ.

444. MUSCA CADAVERUM *Kirby*.—Length of body 4¾ lines. A single specimen taken in Lat. 65°.

Body black, with black hairs and bristles. Antennæ plumate; eyes brown; the cheeks and front in certain lights appear hoary or silvery from inconspicuous down, in others black; feelers subferruginous; trunk and abdomen black-blue with a greenish tint; wings hyaline; intermediate areolet obtusangular; winglets white, bordered with a testaceous nervure.

This species approaches very near to *M. cadaverina*, but the front, winglets and palpi are of a different color.

445. MUSCA MORTISEQUA *Kirby*.—Length of body 5½ lines. Several taken with the preceding.

[317.] Body black, with black hairs and bristles. Eyes brown; cheek and front ferruginous, in certain lights exhibiting something of a golden lustre; feelers long, slender, reddish-yellow; trunk slightly hoary, with three very indistinct black dorsal stripes; wings hyaline, with the intermediate areolet projecting internally into an acute angle; winglets white terminated by a white nervure; abdomen heart-shaped, glossy, blue with a slight tint of green.

This seems to be the American representative of *M. vomitoria*, from which it differs chiefly in having three obsolete black stripes between the wings; in the anterior spiracles not being of a different color from the rest of the trunk; in having white winglets and not black edged with

white; and in the abdomen exhibiting no changeable appearance of chequer-work.

VARIETY B. with a green abdomen.

C. with chalybeous abdomen.

X.—HOMALOPTERA, Leach.

FAMILY HIPPOBOSCIDÆ.

446. HIPPOBOSCA EQUINA *Linn.*—Length of body, excluding wings, 4 lines; including do., 5 lines. Locality not mentioned.

Body flat; subpubescent, dirty-yellow, spotted with brown, with whitish signatures. On the forehead, between the eyes, is a brown quadrangular spot shaped like what are called skates eggs, with four projecting points at the angles; abdomen underneath pale, anus hairy; tarsi with four black claws, the inner ones shorter and truncated; wings much longer than the body.

[An European species. Loew (*Monographs of Diptera*, part i.) divides the order of Diptera into three sections:—*Nemocera*, *Brachycera* and *Coriacea*, and includes this family, with the *Nycteribidæ*, in the last mentioned.]

[318.] XI.—APHANIPTERA.

FAMILY PULICIDÆ.

447. PULEX GIGAS *Kirby.*—Plate vi., fig. 9.—Length of body 2 lines. Two specimens taken in Lat. 65°.

Body ovate, reddish-yellow; segments, particularly the first of the trunk, pectinated with black bristles; antennæ, though short, very distinct, standing out from the head, they seem to consist of two joints, the last conical and obtuse; the base of the second segment of the trunk is

black; the thighs are very flat and wide, inclining to ovate; tibiae armed with long black bristles.

This I believe is the largest flea known, but I have not been able to ascertain upon what animal it was captured.

(Concluded.)

ON TWO NEW CHALCID FLIES FROM FLORIDA, PARASITIC UPON THE LARVÆ OF SYRPHUS FLIES.

BY WM. H. ASHMEAD, JACKSONVILLE, FLA.

Having continued my investigations on Orange Insects, I have made many other discoveries. Among these probably the most interesting is the breeding of two species of *Chalcids* from the larvæ of *Syrphus* flies.

Now, as a general rule, the *Chalcididæ* must be considered beneficial, the majority of them preying upon other insects injurious to the agriculturist, the species belonging to the *Eurytomide* genus *Isosoma*, being, I believe, the only vegetable feeders known among them.

In my recent pamphlet on "Orange Insects," I described and figured several bred from Aphides, Coccides, etc.; besides, I have since bred hundreds from other sources, and all may be considered beneficial.

Nevertheless, there are exceptions to all rules, and those now under consideration must come under that head and be classed as injurious, because they prey upon the larvæ of flies which destroy our orange aphides—pests particularly troublesome to the orange grower in spring and fall. Another strange fact about these *Chalcids*, and which needs a thorough investigation, is this: How do so many manage to live in and subsist upon the Syrphus without destroying it at once? For it is not until the larva has transformed into a puparium, that these little parasites themselves transform—first into pupæ, and afterwards into perfect flies, which escape by eating a hole through the head of the puparium. From a single puparium I had 18 Chalcids (5 males and 13 females). On carefully opening another, I found it closely packed with Chalcid pupæ, like "sardines in a box." Undoubtedly all of these lived as minute worms in the larva of the Syrphus fly, feeding day after day on the fatty substance, but

instinctively avoiding all vital organs. Alas, poor larva! For days the victim of these minute worms, and like the misery of some poor mortal, finds release from suffering only in death.

In Europe, Westwood, Introduction to the Modern Classification of Insects, vol. 2, p. 160, states that *Eupelmus syrphi* Bouche, infests the larvæ of *Syrphus ribesii* and *S. balteatus*. In vol. 1, p. 423, that *Spalangia nigra* is parasitic on the pupæ of the common house fly, *Musca domestica*.

In America I do not know of any having been described from Syrphus flies, excepting *Eriophilus mali* Hald. I consequently presume these are unknown to science, and submit the following descriptions:

SPALANGIA? SYRPHI, n. sp.?

♀. Length .07 inch. Head and thorax black, coarsely, uniformly, but not deeply punctate, and with slight purplish and brassy reflections. Head transverse, much broader than thorax, mandibles 4-dentate, dentations not so deep as in ♂: antennæ 11-jointed, reddish-brown, slightly but gradually widening towards tip, covered with short pubescence; thorax—parapsidal grooves converging towards scutellum, but abruptly ending at middle of mesothorax; collare very short, hardly visible, scutellum convex; abdomen ovate, brownish black, smooth and highly polished, with a slight cupreous tinge at base, and attached to thorax by a short peduncle; legs honey yellow, anterior and middle femora dark, posterior pair being brownish black; wings hyaline, iridescent, veins greenish yellow, stigma slightly thickened at base, stigmal vein with a little pointed knob near the tip.

♂. Length .05 inch. Head and thorax bright greenish golden, punctation as in ♀; antennæ 11-jointed, filiform, reddish brown and covered with rather long hairs, collare very short, hardly visible, purplish; abdomen ovate, purplish black, smooth and shining, with a short peduncle; legs honey yellow, coxæ brassy; wings hyaline iridescent.

Described from 2 ♂ and 5 ♀ specimens bred from the pupæ of *Syrphus philadelphicus*.

PTEROMALUS 4-MACULATÆ, n. sp.

♀. Length .05 inch. Head wider than thorax, bluish purple, microscopically punctate, with mouth parts brownish black; eyes brownish, antennæ 9-jointed, reddish brown, scape very long, as long as all the others combined excepting club; 2nd joint as long as 3 and 4 combined and

thicker; 3rd shortest, others slightly widening towards tip; 9th broadly fusiform and longer than joints 6, 7 and 8 combined; thorax about twice as long as broad, microscopically punctate and with a slight brassy tinge and sparsely pubescent; collare hardly visible; praescutum much broader than long, convex, occupying nearly the whole mesothorax, scuti small, triangular and purplish; scutellum rather large, convex, triangular, tinged with brassy and with the basal margin purplish; pleuræ large, convex, smooth and shining; abdomen very short, sessile, flattened and triangular when seen from above; legs—coxæ brownish, femora and more than half of the tibiæ brownish yellow, tip of femora and balance of tibiae and feet honey yellow, hind legs with rather long tibial spur; wings hyaline, iridescent, with only a short costa and stigmal vein, reaching to one-third the length of wing.

♂. Length .04 inch. Head purplish, vertex and face brassy, microscopically punctate, with a few larger punctures scattered in front of ocelli; antennae 8-jointed, filiform, scape shorter than in ♀ and with the joints irregular and covered with long hairs; callare, unlike the female, is transverse quadrate; scutellum triangular with a brassy tinge and the edges rounded; abdomen longer than in female, blackish.

Varieties of the male occur with the head, thorax and scutellum as in the female, with an attenuated, transverse collare and with 9-jointed antennae; also with coarse punctures on the face and along the margin of the eyes, and with the middle pair of femora yellowish.

These varieties are important as showing how certain species of Chalcid flies are liable to vary in coloration and structure, even those bred from the same brood.

Described from 18 females and 8 males; 13 females and 5 males raised from one larva, and 3 males and 5 females raised from another larva of *Syrphus 4-maculatus* Ashmead, in November, 1880.

This species I place in the genus *Pteromalus* provisionally, for the reason that the description was made from dry specimens and the antennae in the ♂ and the structure of the abdomen of both sexes was too much shrunken to make a critical examination.

ON A LARVA OF MORDELLA.

BY V. T. CHAMBERS, COVINGTON, KY.

In previous numbers of the CAN. ENT. (vols. ix, p. 232, and viii, p. 137) I have given an account of a singular larva found in thorns of *Gleditschia triacanthos* or Honey Locust. I have never succeeded in rearing the imago from the larvæ found in the thorns, but the same larva —or one that I have not been able to distinguish from it—lives also in the pith of the "iron weed" *(Veronia)* and also in that of the "hog weed" or "horse weed," *Ambrosia trifida;* and in the pith of these stems is also found a Lepidopterous larva which I have not been able to rear to the imago state, but which does not seem to differ from that of *Laverna gleditschæella* found in the thorns. Both larvæ, therefore, or larvæ not yet distinguished from them, inhabit the thorns of the Honey Locust, the Iron Weed and the Horse Weed. I have bred the Lepidopterous larva from the thorns; it is that of *Laverna gleditschæelia* Cham., but I have not bred the "curious larva" from them. I have bred the "curious larva" from the Iron Weed, but not from the thorns on the *Ambrosia*. It proves to be the larva of a beetle allied to *Mordella*, if it does not, as I think it does, belong to that genus. I send a bred specimen herewith; it is, I think, a common species. Please give me its name.

From the fact that it feeds in the same stems with the *Lavernæ* larvæ, I thought it probable that the *Mordella* larva fed upon that of the *Laverna*, or upon some of the other larvæ found in the thorns of *Gleditschia;* but it is more probable that the fact simply is that the pith of these plants affords food to all of the species.

I have seen the *Mordella* larva eating its way through the pith, or rather cutting its way with its mandibles, for I never saw it swallow any of the pith, nor have I found any of it in the larval intestine. It may therefore be parasitic on the *Laverna* larva, in the sense that it eats the *Laverna* where it meets it in the stem. But it must be capable of feeding and growing for a long time without meeting the Lepidopterous larva, for it is frequently found in stems and thorns in which no other larvæ have been seen.

Besides the *Laverna* and *Mordella* larvæ, many others also—of other genera and orders—feed in the *Gleditschia* thorns, as I have already stated in the papers before referred to. Thus in these thorns I have found a

beetle larva resembling that of a *Brachys*, one of the Carabidæ one-half an inch long, one of a small bee, and one of a wasp, the names of which have been given me by Mr. W. H. Patton, but to which I cannot just now refer. Mr. Patton also informs me that the ants found in the thorns and mentioned in the former papers (loc. cit.) do not belong to the species and genera there suggested. I mention these species as being on the food of the *Mordella* larva.

But in the pith of the *Veronia* and *Ambrosia* I have found only the *Laverna* larva, that of the *Mordella*, that of one of the larger moths and which I have not succeeded in rearing, and some small Dipterous larvæ. It may be that the Hymenopterous larvæ found in the thorns will yet be found in *Veronia* and *Ambrosia;* but if not, then of course the *Mordella*, if it feeds upon them at all, is not confined to them. This latter larva excited my attention by its singular structure and mode of locomotion. Its maxillæ are much like its legs, and are used as legs; the body is arched so that the feet are brought to bear on the lower surface, and the dorsal tubercles (or as I have elsewhere called them, the dorsal prolegs) are brought to bear upon the upper surface, and all are used as organs of locomotion, and the larva is unable to crawl when in any other position.

Dr. Packard, in the Guide, says of *Mordella* that "the larvæ are said to live in the pith of plants, and are long, sub-cylindrical, and the sides of the rings are furnished with fleshy tubercles." In this species the tubercles are on the back. Westwood (Introduction, vol. 1, p. 293) figures and describes (after Schilling) a form of *Mordella* larva certainly quite different from that of this species. It is called the larva of *M. pusilla* and is said to feed in the pith of *Artemesia*. He also mentions a larva found in the pith of Hoarhound as that of *M. pusilla*, whilst the larvae of the genus *Ripiphorus* are parasitic upon other insects. This larva most probably feeds upon the pith, but possibly it may feed upon some of the other larvae, Lepidopterous or Hymenopterous, which it meets sometimes in the pith. Not being a Coleopterist, I do not know what is known by them as to the habits of the Mordellidae now, and perhaps the facts above given may be new to some of them.

I do not know the duration of the larval state in this species. The larva may be found in the stems in fall and winter and spring, and passes into the pupa state in April and May, remaining in that state for two weeks or more.

Since the foregoing was written I have found the same *Mordella* larva common in the galls of *Gelechia gallæ-solidaginis* Riley, in stems of *Solidago* (Golden-rod) eating into and through the walls of the galls: but not disturbing the larvae or pupae of the moth. But here it eats into the body of the wall of the cavity and does not confine itself to the pith.

NOTE ON HEMARIS BUFFALOENSIS.

BY A. R. GROTE.

The Rev. Mr. Hulst, who has arbitrarily drawn together distinct species of *Catocala*, as *C. crataegi* and *C. polygama*, forgetting that the larva of the former is described, has also referred *Buffaloensis* as a small form of *Thysbe*, or *uniformis*. But Prof. Lintner has described the larva of *Buffaloensis* (Ent. Cont. II., 8), and in answer to my enquiries Prof. Lintner states that *Buffaloensis* is well known to him and may be distinguished by the different shape of the discal cell of primaries, the cross-bar of scales nearly fusing with the lower edge of the cell and not running in the centre of it. I have myself no doubt of the validity of *Buffaloensis*, which is probably unknown to Mr. Hulst, but what I wish to call attention to is the reckless way in which distinct forms have been recently united without all the facts or literature being studied or known.

ENTOMOLOGICAL NOTES.

On the 11th of June I took a pair of *Saperda Fayi* upon thorn, a rather rare insect with Canadian collectors hitherto, I believe. Ten years ago or more I captured one, and had not met with it since, but this year amidst a general scarcity it seemed to be quite abundant here, the different collectors finding it well represented in every direction around the city. One day, coming on a favorable locality, I took 19; returning to the same place the following afternoon, I got 30, and had to leave before 4 o'clock on account of rain—going back a few days later and securing 34. I found old bushes in an exposed situation the most productive.

Hamilton, Ont. J. ALSTON MOFFAT.

CUPES CAPITATA.

For some years past I have been, during the month of July, in the habit of collecting specimens of this pretty little beetle on the fence of a churchyard adjoining my residence. This year they were exceedingly numerous, and I captured in four days over 80, of which some 50 were females. It is curious to note that I have invariably found that certain pickets of the fence were selected by the beetles, and that out of a long distance of fencing round the sides of the church, these few pickets on one side would be the only place to find the beetle. I can give no reason for such selection—the trees and food plants round the fence are similar: they congregate for breeding purposes and then suddenly disappear, and can only be rarely found afterwards. Do any of our readers know the life history of this beetle? E. Baynes Reed, London, Ont.

THE CODLING MOTH.

Prof. E. W. Claypole, of Antioch College, Yellow Springs, Ohio, in a recent communication states that he has lately captured two specimens of this moth, *Carpocapsa pomonella*, at sugar under an apple tree. Whether they were chance captures or whether they were attracted by the sugar he is unable to form an opinion.

I received more than a year ago two specimens of *Eristalis tenax* Lin. collected in Washington Territory by Mr. H. K. Morrison. The specimens on careful comparison show no differences whatever from typical eastern ones. The peculiar hairy markings of the eyes, to which my attention was directed by Baron Osten-Sacken, are quite the same. I have specimens also from Kansas, showing that this common European fly has spread over the whole United States since it was first observed by Osten-Sacken in November, 1875, or somewhat earlier by Mr. Patton. The fly at present is very abundant in the vicinity of New Haven, making its appearance about the middle of July and remaining till cold weather, in early October being frequently found in houses and gardens. That this species should have become so very widely spread in three or four years seems remarkable, but, on the other hand, it would seem more remarkable that so conspicuous and common a fly should have entirely eluded so experienced and zealous an Entomologist as Baron Osten-Sacken, had the species really been in North America earlier.

S. W. Williston, M. D.

The Canadian Entomologist.

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NOTES ON THE PREPARATORY STAGES OF PAPILIO CRESPHONTES, Cram.

BY G. H. FRENCH, CARBONDALE, ILL.

Egg—Spherical, a little flattened at base, .06¼ inch in diameter, pale ochre with sometimes a greenish tinge, at others inclining to orange. Duration of this period six days.

Young Larva Length .11 inch; the body covered with tubercles from which project small spines; color dark brown, the tubercles on all but the first of the anterior joints a little lighter, joints 6 and 11 straw color. Duration of this period three days.

After 1st Moult—Length .31 inch. General color and shape the same, the body having a shining appearance, six tubercles on each of the first four joints, the upper four more prominent, two small tubercles on the back of each of the other joints, the posterior pair more prominent, joints 6 and 11 a little paler than before. Being busy, no notes were taken of the second moult, but the general appearance was much the same. From the first to the third moult was six days.

After the 3rd Moult—Length .75 inch. Body shining, appearing more as though wet, the tubercles all disappeared except on joints 1 to 4, joint 3 the largest, from joint 4 to 5 an abrupt decrease to the size of the posterior joints; head olivaceous, the ridge on joint 1 pale olivaceous, parts of joints 5 and 6 creamy tinged with olivaceous, the terminal part of body somewhat enlarged and pearly whitish on the back, tinged with olivaceous round the edges, the rest of the body olivaceous brown. Duration of this period five days.

After 4th Moult—Length 1.25 inches; the dark parts rich dark brown; a prominent ridge over the middle of joint 3 and over the back part of joint 4 a lighter shade of brown, each ridge containing several white rings, there also being a few on the dorsum in front of the ridge on joint 4; a white band above the head, this organ when the animal is at

rest being under joint 1, this white band reaching round the sides to the elevation on joint 4, the lateral portion mottled with olive and brown. The boundaries of the light spaces back of joint 4 varying slightly in different specimens, but in all the anterior one reaches on the sides to the first pro-leg. Each side of the dorsum on joints 8, 9, 10 is a dark brown patch with a bright elliptical violet spot in the centre, the patch more or less surrounded with mottlings of white, the last pair of patches nearly surrounded and often partly absorbed by the light that covers the rest of the body. Joints 2, 3, 4 have each four small dots of the same violet hue, while on each side of joints 8, 9 is a cluster of fine blue points. Each joint, except such as are light at this place, has a cluster of these little points below the stigmata. The light space in the middle of the body is more or less mottled with pale olive. Duration of this period to the time it suspended in its loop to change to chrysalis, five days.

Mature Larva—When full grown length 1.75 inches, width of widest part, or joint 4, .56 inch, narrowest part, or joint 10, .25 inch, of joint 11, .31 inch. The anterior part of body much thickened, a prominent ridge extending across joint 1, along the sides and over the back part of joint 4, tne latter being the highest part. Inside of this space is somewhat flattened. Back of joint 4 it tapers rather abruptly to the posterior part of joint 5, after which the body is nearly cylindrical. The scent organs about .50 inch, bright dark red. From the time of suspension to casting the last larva skin one day, or more nearly thirty hours.

Chrysalis—Length 1.50 inches, some a little shorter; the ventral side strongly arched, the dorsal incurved but not very strongly; head case long, depressed, the sides parallel, scarcely wider at base, ocellar prominences long, subpyramidal, not divergent, two teeth on the inner edge of each, a dorsal tubercle at the base of each prominence; mesonotum rather low, edges slightly carinated, anterior elevation bilobed; abdomen with a subdorsal row of small tubercles. Surface granulated. Color variable. One form gray marked with dark gray and brown, another form pale green marked with gray and brown, the latter color mostly on the head case and down the ventral part of the thorax.

The pupal period varies. One of the two observed from which these notes were taken produced the imago fourteen days after pupating, making forty days from the time the butterfly was observed depositing the egg to the imago. The other one is at writing still in chrysalis. Fourteen days

is the shortest pupal period I have observed in rearing this species. From some former notes I have the following pupal periods of 15 specimens:

1	produced the imago	in	16 days.
4	"	"	17 "
2	"	"	18 "
3	"	"	19 "
1	"	"	20 "
2	"	"	21 "
1	"	"	22 "
1	"	"	24 "

These were the early brood producing the imagines in July, though I might say that about one-eighth of this brood, instead of hatching in July, pass the winter in this state to produce imagines in the following spring. The one that is mentioned above as having a pupal period of 14 days was deposited as an egg June 6th, and produced the imago July 16th. I can see no difference between either the larvæ or the butterflies of those fed on Prickly Ash and those fed on Orange leaves.

NOTE.—Since writing the above the second of the two from which notes were taken has produced the imago, its pupal period being 39 days. The time of hatching was August 10th, having a period of 65 days from the depositing of the egg to the imago. This is the longest period of any of the summer brood of which I have kept a record.

MEETING OF THE SUB-SECTION OF ENTOMOLOGY OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The meeting of the American Association for the Advancement of Science was held at Cincinnati, Ohio, commencing at 10 o'clock a. m. on Wednesday, the 17th of August, 1881. At the conclusion of the opening exercises the several Sections proceeded to organize, when the Sub-section of Entomology was called to order by the President, Rev. J. G. Morris. A large number of Entomologists were present, among others C. V. Riley, Washington; Cyrus Thomas, Carbondale, Ill.; Wm. H. Edwards, Coal-

burgh, W. Va.; J. A. Lintner, Albany, N. Y.; Rev. J. G. Morris, Baltimore, Md.; Wm. Saunders, London, Ontario; E. W. Claypole, Yellow Springs, Ohio; Miss M. W. Brooks, Salem, Mass.; B. Pickman Mann, Washington; C. D. Zimmermann, Buffalo, N. Y.; A. J. Cook, Lansing, Mich.; J. D. Putnam, Davenport, Iowa; S. H. Peabody, Champaign, Ill.; V. T. Chambers, Covington, Ky., and Chas. Drury, Avondale, Ohio.

On Thursday, August 18th, the Sub-section of Entomology met at 2.30 p. m.

The first paper read was by Prof. C. V. Riley, on Retarded Development in Insects. In this paper the author recorded several interesting cases of retarded development in insects, whether as summer coma, or dormancy of certain portions of a given brood of caterpillars, the belated issuing of certain imagines from the pupa, or the deferred hatching of eggs. One of the most remarkable cases of this last to which he called attention was the hatching this year of the eggs of the Rocky Mountain Locust or Western Grasshopper, *Caloptenus spretus*, that were laid in 1876 around the Agricultural College at Manhattan, Kansas. These eggs were buried some ten inches below the surface in the fall of 1876 in grading the ground around the chemical laboratory, the superincumbent material being clay, old mortar and bits of stone and a plank sidewalk above this.

In removing and regrading the soil last spring, Mr. J. D. Graham noticed that the eggs looked sound and fresh, and that they readily hatched when exposed to normal influences; the species being determined by Prof. Riley from specimens submitted by Mr. Graham. Remarkable as the facts are, there can be no question as to their accuracy, so that the eggs actually remained unhatched during nearly four years and a half, or four years longer than is their wont. This suggests the significant question: how much longer the eggs of this species could under favoring conditions of dryness and reduced temperature, retain their vitality and power of hatching.

Putting all the facts together, Prof. Riley concludes that we are yet unable to offer any satisfactory explanation of the causes which induce exceptional retardation in development among insects. The eggs of Crustaceans, as those of *Sepus* and *Cypris*, are known to have the power of resisting drouth for six, ten or more years without losing vitality, while in some cases they seem actually to require a certain amount of desiccation before they will hatch. Yet the fact remains that different species act differently in this respect, and that individuals of the same species under

like external conditions of existence act differently, that temperature, moisture, food, &c., do not influence them alike. We can understand how this great latitude in susceptibilty to like conditions may and does in the case of exceptional seasons prove beneficial to the species by preserving the exceptional individuals that display the power to resist the unusual changes.

The next paper was by the same author, on New Insects Injurious to American Agriculture, in which attention was called to several insects hitherto unknown as injurious, which during the present year have proved very destructive to one crop or another. Such hitherto unknown and unreported injury is either caused by—1st, imported species; 2nd, native species previously known but without destructive habit; 3rd, unknown or undescribed species.

Mr. W. H. Edwards then read a paper on certain habits of *Heliconia charitonia*.

Some interesting discussions followed the reading of these papers, after which an informal discussion on Entomological subjects took place, in which many of the members joined. The meeting then adjourned.

On Friday, at 11.30 a. m., the Entomological Sub-section held another session.

The first paper, "On the Length of Life of Butterflies," was read by W. H. Edwards, followed by one on the Life Duration of the Heterocera, by J. A. Lintner, both of which will appear in the pages of the ENTOMOLOGIST.

A few remarks were made by C. V. Riley on his own extended observations on the duration of the lives of both butterflies and moths, indicating that they were as a rule of very short duration.

Cyrus Thomas stated that according to his observation the Army Worm, as a caterpillar, a chrysalis and a moth, existed in all seventy-seven days. Some observers had, however, made it seventy-six, others seventy-nine days. He contended that in confinement, in a proper temperature and with ample food, the Army Worm passed through its metamorphosis more quickly than in natural conditions.

B. P. Mann disagreed with Mr. Thomas on this latter; so also did C. V. Riley, it being contrary to their experience.

J. A. Lintner, State Entomologist of New York, then read a paper on "A Remarkable Invasion of Northern New York by a Pyralid Insect."

He said that about the middle of May, of the present year, a serious

invasion of St. Lawrence County, N. Y., and several of the adjoining counties by the "army worm" was announced. It was stated that many pastures had been completely ruined, and the entire destruction of the pastures and meadows was threatened. Not having witnessed the operations of the army worm, he at once visited the infested locality. The reports had not been exaggerated. The injury was widespread and serious, already extending over eight of the northern counties. Hundreds of acres of grass presented a brown appearance, as if they had been winter killed. A pasture lot of fifty acres, which, ten days before, offered good pasture, was burned so that in places not a blade of grass could be seen to the square yard. Numerous dead caterpillars were adhering to the dead stems of last year's grass, which it was believed had fallen victims to starvation. The upland pastures were first attacked. The progress was remarkably rapid; entire fields were laid waste in ten or twelve days. The secrecy of the depredations was remarkable. The larvæ had seldom been seen, and never observed in active feeding. It was believed by the farmers that they fed at night, or by drawing the blades of grass into their subterranean retreats. In two instances the larvæ were observed in immense numbers, collected on the trunks of trees so that they could have been scooped up by handfuls.

The tree trunks were enveloped by a firm web of silk, spun by the caterpillars, of so firm a consistence that it could be lifted up in a sheet like a piece of woven silk. The cause of the congregation at this point could only be conjectured. It was not for feeding on the foliage, for the grasses alone were eaten by the caterpillars.

The caterpillars observed and collected by Mr. Lintner were slender, cylindrical forms, sixteen footed, of an obscure greenish color, with a shining black head. They were destitute of lines or other ornamentation, except some warty spots on their upper side. Their average length was three-fourths of an inch. He was unable to identify them with the army worm, for they were quite unlike the mature form of that species, and their habits seemed to be quite different.

On the 6th of August the first moth emerged from some cocoons furnished by Mr. J. Q. Adams, of Watertown, N. Y., and it turned out to be a *Crambus vulgivagellus*.

The interesting question as to which of our insect depredators was chargeable with the ravages in Northern New York was decided. The new enemy was found to be an inconspicuous, hitherto unobtrusive little

Crambus. It had long been known in our cabinets, but had never before presented itself as an injurious insect.

It is probable that several accounts of injuries to pasture lands in New England States during the last three or four years, which have been ascribed either to the army worm or an unknown depredator, are due to this species. Its subsequent appearance may hereafter be recognized.

The Crambidæ are small moths with narrow front wings often marked with metallic spots and stripes, which are frequently driven up for short flights in our pastures and meadows during the fall months. Specimens of the larvæ, pupæ, cocoons and perfect insects were exhibited to the Section.

Following this three papers were read by A. J. Cook, of Lansing, Mich., "How Does the Bee Extend its Tongue?" "The Syrian Bees," "Carbolic Acid as a Preventive of Insect Ravages."

The author explained how the bee extends its tongue by means of a diagram; it is done, he believes, by forcing into the extremity of that member some of the fluid contained in the glands. In his paper on Syrian Bees he related how D. A. Jones, of Canada, and Frank Benton, of Michigan, went to Europe in search of new varieties of bees. They brought from Cyprus both the Cyprian bee and the Syrian bee, and Mr. Benton went to Ceylon and Java in search of other varieties. From the former place he brought two new species not very unlike our own, but in Java he failed to find the great Java bee. With the Syrian bees the author had Syrianized the apiaries of the Michigan Agricultural College. The Syrians are of a yellow type, closely allied to the Italian bee; they are indefatigable workers, but more irritable than other bees, especially when queenless. They are undoubtedly a valuable acquisition to American apiculture.

The next paper was by Mr. W. H. Edwards, on "The Alleged Abnormal Peculiarity in the History of *Argynnis myrina*," which was followed by one by E. W. Claypole, of Yellow Springs, Ohio, on the Buckeye Stem Borer. The writer remarked that during the spring months some of the leaves of the Buckeye tree droop and die without any obvious cause; indeed these dying leaves may be seen almost as soon as the foliage is expanded. On examination a small hole was discovered in every stalk on which a dying leaf was found, and in splitting this round stalk a living caterpillar was observed ensconced in the narrow tunnel evidently excavated by itself. The destruction of the central part of the leaf stalk

was clearly the cause of the death of the leaf. A number of leaves were collected and the larva reared in confinement, producing a small moth closely resembling *Sericoris instrutana*. When or where the egg is laid has not been discovered. The young larvæ may be found in the leaf stalks of the Buckeye tree from the 2nd to about the 8th of May. After spending a few days in this secure retreat, it comes out and dwells for the rest of its caterpillar life in the dying leaf at the top of the stem upon which it feeds; after thus feeding for about a fortnight it passes into the chrysalis state, from which in about ten days more it emerges a moth.

The President then read his annual address.

PRESIDENT'S ADDRESS.

Gentlemen,—I regret exceedingly that I am compelled to begin my address by the recital of a melancholy event in the history of our Section.

About ten days after our adjournment last year, and after probably we had all arrived at home and settled down to our autumn's work, the distressing intelligence reached us of the sudden death of one of our most honored and distinguished members. He had mingled with us at Boston and had taken part in our deliberations, and though cheerful and full of hope, yet his usually buoyant temperament was plainly mellowed by advancing years, the every-day anxieties of life, and the pressure of severe intellectual pursuits. He returned home after our adjournment and immediately resumed his linguistic studies with his usual incessant ardor, for he often said to me: "I never take exercise when I am at home, but work all day and sometimes late into the night," and on the 1st of Sept., 1880, Samuel Stehman Haldeman was suddenly stricken down. His lamented death has been noticed in most of the leading papers and scientific journals of the country, accompanied with some biographical facts, for he was widely known as a scholar and scientist, and no man was more highly esteemed as a companion and gentleman. We all are aware of the distinction he achieved in letters and science in our own and foreign countries, of the learned books and papers he has written, and of the titles and prizes which his works secured for him.

If this were the proper place, it would be pleasing to dwell, even at length, upon the many valuable traits of his character, the vast extent of his diversified acquirements, and his almost unparalleled qualities as a friend and scientific fellow-laborer. I feel as if I were announcing the death and reciting the admirable virtues of a brother. For forty years he

and I were what may properly be called "bosom friends." In early life we were engaged in similar scientific pursuits, and living but a few hours' distance from each other, our mutual visits were frequent and our warmest friendship and confiding intercourse continued uninterrupted to the end.

It is well known that in early life he devoted much of his time to our favorite science, to which he made some valuable contributions. His principal papers are: Materials toward a History of Coleopterous Longicornia of the U. S.; Corrections and Additions to this paper; Description of N. Am. Coleoptera; Cryptocephalinorum Borel. Am. Diagnosis. These papers give evidence of honest and painstaking research, patient analysis and sharp discrimination, and are profitably consulted by investigators at the present day.

Of late years he had turned his attention particularly to the study of Language, and became a distinguished member of the Philological Society. All readers know the celebrity he attained in that department and the ardor with which he pursued those studies, but notwithstanding their engrossing attractions, he never ceased to feel an interest in everything that concerned our department. It is hard for a man to forget his first love.

Thus much I thought it proper to say of the lamented Haldeman. He was no ordinary man whom you might compliment with a passing respectful obituary notice. In science and letters he was a great man. His memory will be long cherished by admiring friends. "*Idem extinctus amabitur.*" It may not be out of place to mention here one fact to me, at least, personally interesting. Less than two months ago the monument of Haldeman, chiseled out of enduring granite by Strecker, a brother Entomologist, was erected over his grave by the pious care of the skillful artist himself, who spends his days in cutting marble and granite into classic forms, and half of his nights in studying and figuring the butterflies of his own unequalled private collection.

Gentlemen, forty years ago I could count the known working Entomologists of our country with the first ten numerals. The older Melsheimer, who may properly be designated as the father of our science in this country, Say, Peck, Gould, Randall, Peale, and a few other pioneers, had died or retired, and the only workers then were Harris, of Cambridge; Major LeConte and his son John L., of the City of New York; Fitch, of the State of N. Y.; Haldeman, Melsheimer, jr., and Zeigler, of Penna., and a few others of no special note, were the only ones, as far as is at

present recollected, who prosecuted our science with any zeal and who contributed to its progress by the descriptions of species. There were others who collected insects, but they made no claim to be scientific Entomologists. I remember distinctly when Melsheimer, Haldeman, Zeigler and I used to meet several times a year at our respective homes to read papers, discuss questions, exhibit new species, recite our Entomological adventures and then adjourn to a well appointed table. We regretted that we had no collaborators within two hundred miles, for the LeContes, in New York, were our nearest neighbors. In that day there was not a man in Philadelphia who studied insects. We then established "The Entomological Society of Pennsylvania," and after electing all our confreres in this country as honorary members, we had the audacity to confer the same distinction upon some great men abroad, whose letters of grateful acceptance indicated that they thought that the Society was something more than a club of four comparatively unknown men meeting in Haldeman's study on the banks of the Susquehannah!

And now look at the mighty change. In the Naturalist's Directory for 1880 there are no less than 436 names reported as pursuing our science. Now, whilst it is true that many of these may be collectors only, still they are more or less useful. They all must be interested in it to a greater or less extent or they would not have reported themselves as such. Be this as it may, the increase is simply wonderful and very encouraging. Doubtless there are numerous others in the country engaged in the same delightful employment whose names do not appear in the Directory.

There is no other distinct branch of science that has so many representatives in that book as ours, excepting Botany and Geology, and in Zoology specially we are ahead of the Ornithologist by over 50; the Conchologists are fewer than 100 all told, and all other specialists in Zoology are behind us. All this is cheering, and we are sure that the number of collaborators is growing every year.

But there is a still more encouraging view of the subject, which is founded not only on names, but on facts, and I am sure it will gratify the Section to hear of the number of the published contributions of our fellow workmen. True, they are not all members of this Section, but they belong to the family and we hail them as brethren of the same household.

Most of us have, of course, kept our eyes upon the various journals and have been pleased to see so many papers, and yet perhaps few of us

have any proximate conception of their number and variety. Hence I have thought that probably the most acceptable contribution I could make at this meeting would be a complete list, as far as was possible, of all American Entomological writers since our meeting in August last, and this I have done and will present it at the proper time. Some names may have been inadvertently omitted, but these can be subsequently introduced. In order to insure perfect accuracy and fullness, I made the list of each author's writings as far as I could find them and sent it to him for correction, and I here desire to thank those gentlemen for the uniform courtesy with which they granted me their aid.

This paper will give us a better idea of the progress of our science during the past year than any other mere description possibly could.

A brief analysis of it gives 77 writers and 302 titles; 25 of these articles treat of Coleoptera; 19 of Lepidoptera; 15 of Orthoptera; 5 of Neuroptera; 10 of Diptera; 11 of Hymenoptera; 11 on Hemiptera; 8 or 10 describe larvæ of various orders; 5 or 6 are on fossil insects; a few on Myriopods and spiders, and 11 on Economic Entomology.

This brief exhibit will give an idea of what has been done as far as has been made public. Doubtless there are many other papers in preparation, and much efficient work has been privately done which may never be published.

It would be out of my province to specify any of these writings in this address, and much more to express any opinion of their relative value, or to indulge in any critical remarks. That must be left to the reviewers.

We now have four journals exclusively devoted to our science, and in several others considerable space is allotted to it. In connection with these must be mentioned the annual reports of the State Entomologists. The Proceedings and Transactions of all Natural History Societies also contain frequent articles upon the subject.

The Canadian Entomologist, Psyche, The Bulletin of the Brooklyn Ent. Society, and Papilio, should be supported by every one of us. Indeed, no man can know how our cause is advancing without them, and as it is likely that none but Entomologists read them, so much the more general should be our patronage that they may be maintained.

Each of these four seems to occupy its peculiar field. The Canadian is general and the organ of a special association. Although it is geographically *extra limital*, yet it is very near to us and a large share of its

original papers come from this side of the Niagara. We claim it as one of our own, and being the oldest and admirably conducted, we hope that its present efficient editor may long continue to conduct it and render it still more interesting and instructive.

The next oldest is Psyche, and in relation to it I may quote what our first President said in his opening address: "Psyche, though small, is indispensable to every one occupied with the insects of North America." It covers a ground not occupied by any other periodical in the world, and is very creditable to the disinterested labors of American Entomologists. Its accuracy has never been questioned, and it is extremely desirable to secure its continuous publication. You know that it was begun by the Cambridge Entomological Club, which is really the parent of the Club of the A. A. A. S., which has now been elevated to the dignity of a Sub-Section. The Cambridge Club differs from some others in the country in freely granting the use of its library to Entomologists throughout the whole country, and hence it is very desirable that the library should be enriched and the Club thus enabled to extend its benefits still more widely.

The Bulletin of the Brooklyn Entomological Society is a spirited publication, displaying much zeal, correct diagnosis and careful description.

Papilio, the youngest of the family, is entirely devoted to Lepidoptera and thus occupies an exclusive field and cultivates it successfully. The necessity for it arose, I apprehend, from the fact that our investigators had so much that was new to publish, that room could not be found in the other journals, and when we consider that the number of our writers is increasing every year and new discoveries are constantly made, it is plain that all the journals now in existence among us could not publish all the communications unless the journals were greatly enlarged. As it is likely that all these editors render their valuable services gratuitously, and that the present patronage would not justify an enlargement, we shall have to be content for some time to come with their present size.

In conclusion, I will make bold to throw out one or two suggestions.

1. In view of the wonderful progress which our science has made in this country, has not the time come for condensed, complete, systematic books on each of the Orders, after the style of many German books that might be mentioned? Every one of us is often asked by beginners: What book would you recommend on beetles? And our answer is: there is none which contains descriptions of all our known species in

systematic order, but you must gather them from various monographs, journals and proceedings, which are not easy to procure. This disheartens the young student. The same is to a great extent also true of butterflies, especially of Noctuidæ, and of other orders of insects, although the want is supplied in Lepidoptera more fully than in any other. But even this order, beyond the Diurnals, although hundreds of species are described, has not been brought together in systematic arrangement. The material is at hand, and nothing is wanting but a competent editor and an accommodating publisher to bring out a series of works which would contribute immeasurably to our progress.

My second suggestion is, that it would be interesting to know the extent, character and condition of the larger public and private collections in the country, with a mention of the varieties they contain. This might embrace two sections, those of our own species and those of foreign countries. A paper on this subject for next meeting would be an interesting contribution, and I hope some gentleman will furnish it; or let some member be appointed, so that there may be no conflict, and the whole field be open to him. No doubt the owners of private collections and the curators of public ones would cheerfully render him their counsel and aid.

And now, gentlemen, congratulating you upon our meeting again, let us proceed to our business and prosecute it with vigor, patience and order.

JOHN G. MORRIS.

At the conclusion of the address a vote of thanks was tendered to the President, coupled with the request that the copy be sent to the CANADIAN ENTOMOLOGIST for publication, which was kindly assented to.

(To be Continued.)

CARBOLIC ACID AS A PREVENTIVE OF INSECT RAVAGES.

(Read before the Sub-Section of Entomology of the A. A. A. S.)

BY A. J. COOK, LANSING, MICH.

One year ago I gave at the Boston meeting of the Association for the Advancement of Science the results of some experiments in the use of London purple to destroy the codling moth larva, and bisulphide of carbon in fighting the cabbage maggot and squash borer. These experi-

ments have been repeated the present season, and with results no less favorable than those reported one year ago. I think it is an established fact that the methods recommended are valuable. They not only seem reliable, but they promise to be the cheapest and most desirable modes that can be made practicable on all occasions.

As stated last year, the bisulphide of carbon will also destroy the radish maggot *(Anthomyia raphani)*, but owing to the great number of plants to be treated, the amount of the liquid necessary to do thorough work is large, and so the expense is perhaps too great to warrant its use in case of this insect. The present season I tried to see if we might not make the application in a few places about the bed, at some distance apart, and still effect our purpose to destroy the maggots. The result does not recommend this liquid for the destruction of the radish Anthomyia with the same emphasis that we may safely give in advising its use for the cabbage Anthomyia and the squash Ægerian. This fact led me to cast about for some more desirable agent to be used against the radish fly, and it occurred to me that carbolic acid, which is not only very repellant to insects, but also quite as remarkable in retaining its obnoxious odor for a long time, might be made most serviceable in this warfare.

I prepared some of this material as follows: To two quarts of soft soap I added two gallons of water. This was then heated to a boiling temperature, when one pint of carbolic acid (in a crude state) was added. This mixture is then set away in a barrel or other vessel, and is ready for use as occasion may require. I mixed one part of this liquid to fifty parts of water, to be used on the radish plants. It was used by three parties in three places. Mr. Lee used it in the College garden, a student—Mr. E. Hale—used it on a bed specially prepared, and I used it in my own garden. Mr. Lee sprinkled it on the plants and poured it into a trench made close beside the row of plants. Mr. Hale and myself sprinkled it directly on the plants. Messrs. Lee and Hale made but one application and found that it kept the insects at bay for about two weeks. Even this proved of no little service. I made the application once every week, and the radishes were almost entirely free from the maggots. My bed was seventy or eighty rods from the other beds. But I caught the flies about my garden, and plants near by, not treated, were badly injured by the maggots. Two cautions should be urged; first, sprinkle the plants as soon as they are up, and thereafter every week or ten days; secondly, the mixture, if sprinkled directly upon the plants, must not be so concentrated

as to injure the plants. My experiments this season make me feel certain that this will prove a valuable remedy, and if cheaper, it may even replace the explosive bisulphide of carbon in fighting the cabbage maggot and the squash Ægerian.

About my house at the Michigan Agricultural College I have planted a little apple orchard of eight trees. The trunks and larger branches of these trees have been thoroughly washed twice each spring, the last week of May and the last week of June, with soft soap. A neighbor but a stone's throw distant set out some fine primates about the same time that I set out my trees. He does not believe in the use of soft soap, practically at least, and his trees are sorely disfigured and greatly injured by the *Saperda candida* and the *S. cretata*, while my trees are smooth and admired by all. I have some pear trees in the same orchard which were not treated with the soap, one of which has been much injured by the borers.

This year I used the undiluted carbolic mixture instead of the soft soap. I fully believe this to be an improvement on the soap alone, as in some cases, if but one or even two applications of the soap are made, the effect is not so long continued as to entirely prevent the borers from egg laying. The carbolic acid will tend to extend the period so that I believe two applications will in every case repel the beetles.

"ON SOME NORTH AMERICAN TINEIDÆ, BY THOMAS, LORD WALSINGHAM, F. Z. S."

BY V. T. CHAMBERS, COVINGTON, KY.

The above is the title of a paper received from the author, and published in the Proceedings of the Zoological Society of London (February 15th, 1881), in which his Lordship characterizes three new genera: PHRYGANEOPSIS—one species, *P. brunnea;* ARÆOLEPIA—one species, *subfasciella;* and EUCERATIA—two species, *castella* and *securella*. He also describes as new *Calantica polita, Plutella interrupta, P. albidorsella* and *P. vanella; Cerostoma falciferella, C. cervella. C. sublulelia, C. dentiferella, C. canariella* and *C. frustella; Depressaria sabulella, D. argillacea, D. arnicella, D. klamathiana, D. posticella, D. nubiferella, D. parilella*

and *D. umbraticostella; Menestia rubescens; Glyphipteryx regalis, G. californiæ, G. bifasciata, G. unifasciata* and *G. quinqueferella*, and *Heliodines extraneella. Plutella cruciferarum* Schrank, is mentioned as found on Mount Shasta, California (as indeed it is found, as Mr Stainton says, wherever man eats cabbage, and perhaps wherever *cruciferæ* grow), and is identified probably with "*Tinea spilotella*" mentioned in a note in the American Naturalist, v. 8, p. 194. *Plutella porrectella* Linn. was taken also on Mt. Shasta, and on the authority of Mr. Stainton (Tin. Nor. Amer. p. 90) is identified with *P. vigilaciella* Clem.

Cerostoma instabiliella Mann. was also taken on Mt. Shasta. *Cerostoma radiatella* Donovan was taken in Oregon. *Depressaria ciliella* Stn. was taken in Oregon, but its common European form, *D. aplana* Fabr., "was conspicuously absent, nor have I met with it in any American collection," says Lord Walsingham. *D. yeatiana* was taken in Oregon, and has been received also from Texas. *D. nervosa* Haw. found in Oregon. *D. parilella* Treitschke: one specimen from the Eastern States agrees fairly with the European descriptions, whilst the Western specimens differ among themselves somewhat, and from the European species still more, so that Lord Walsingham is left in some doubt as to whether they really belong to the same species, and in case an investigation of its habits should show it to be distinct, he suggests for it the specific name of *novi-mundi. D. emeritella* Stn. found in Oregon on *Artemisia. Gelechia liturella* Walk. identified with *Menestra tortrici-formella* Clem. The locality of Lord Walsingham's specimens is not mentioned, nor is that of *Calantica polita;* the other species, except as above indicated, are from California and Oregon.

Lord Walsingham has also favored me with specimens of many of the above-mentioned species and some others. All of the species described as new are I think undoubtedly so, and some of the species previously known are new to America. *Phryganeopsis* "should be placed near the genus *Incurvaria*." *Calantica polita* is the first species of the genus found in America. The genus *Arcolepia* is near *Plutella* Schrank and *Plutelloptera* Cham. *Plutella interrupta* is the American representative of the European *P. annulata* Curtis. Lord W. thinks (and no doubt he is right) there is scarcely sufficient evidence of the existence of *Cerostoma xylostella* Linn. in America, and as *C. brassicella* Fitch has already been identified with *Plutella cruciferarum*, the eight species found by his Lordship on the Pacific Coast are the first that have been found in North

America, and two of these (*instabiliella* and *radiatella*) were already known in Europe. The genus thus seems to be confined to the Pacific Coast in this country.

His Lordship gives some valuable notes upon the genus *Depressaria*. Thus he thinks that *D. georgiella* Walker belongs to the genus *Trichotaphe* Clem., and would more properly be included in *Gelechia* than in *Depressaria*. *D. clausella* Walker is *D. cinereocostella* Clem., and *D. confertella* Walker is *Cryptolechia (Machimia) teutoriferella* Clem. "It has since been described by Mr. Chambers under the name of *Depressaria fernaldella*. I am assured by Prof. Fernald that he is well acquainted with the species" (*fernaldella?*) "and that it agrees with a specimen of the true *C. teutoriferella* which I received from him for comparison with Mr. Walker's *D. confertella*. But I am aware that Mr. Chambers himself still doubts their identity." I have never had an opportunity to compare *fernaldella* with *teutoriferella*, but as stated in the U. S. Geol. & Geog. Survey, I described *fernaldella* as distinct from *teutoriferella* because I could not recognise it in Dr. Clemens' description of the latter, though there admitting the fact that they might nevertheless be the same. Lord Walsingham mentions that *D.? pallidochrella* Cham., *D.? rileyella* Cham. and *D.? versicolorella* Cham. are by me doubtfully referred to *Gelechia*. I now think that whether these species are properly referable to *Gelechia* or not, they do not belong to *Depressaria*, and after eliminating these, "we have then eleven unquestioned species of *Depressaria*, viz., *D. atrodorsella* Clem., *cinereocostella* Clem., *clausella* Walker, *eupatoriella* Cham., *grotella* Robinson, *helaclina* De G., *hilarella* Zell., *nebulosa* Zell., *pulvipennella* Clem. (*pulvipumella* in Lord W.'s paper is no doubt a misprint), *robiniella* Pack. and *scabiella* Zell." So says Lord Walsingham, and probably he is right, though I have some doubts about *robiniella*, which, however, I have not seen.

Passing on to the genus *Glyphipteryx*, the species are all undoubtedly new except perhaps *G. Californiæ*, which will probably prove to be identical with that described by me as *G. montisella* from Colorado. There are specimens of *montisella* in my collection in Cambridge Museum and in some other collections, but I have none now at hand for comparison. I think it highly probable, however, from my recollection and notes of that species, which is very variable, that *Californiæ* will prove to be the same species. I will state here that I described *G. exoptatella* as new because I was unable to recognise it in Dr. Clemens' description of his *G. impigritella*. Neither yet now am I able to do so. Recently,

however, I have seen an authentic specimen of *impigritella* without the means of comparing it with *exoptatella;* and I now think it not improbable that *exoptatella* will prove to be that species. *G. montisella*, however, is something quite different.

After describing *Heliodines extraneella*, Lord Walsingham proceeds to discuss the question whether the genus *Aetole* Cham. is the same with *Heliodines*. I suspected as much when I described *Aetole bella*, but my knowledge of *Heliodines* was then and is now too imperfect to me to feel certain about it. Lord W. gives my brief account of *Aetole* and Mr. Stainton's still briefer account of *Heliodines* in Ins. Brit. v. 3, with copies of Mr. Stainton's and my figures of the neuration of the genera, and alludes to the discrepancy between my printed account of the neuration of the fore wings of *Aetole bella* and my figure. The discrepancy exists, and in my original pencil sketch of the neuration I find this endorsement made by me just after the figures were published : " the published figure is incorrect in that it does not represent the apical vein as being furcate," and the original figure represents it as being furcate. This being supplied, the neuration of the fore wings is the same in the two species, and not as Lord Walsingham thinks, simply corresponding " very closely with the exception of the absence of a short vein in *Aetole*, which in *Heliodines* runs from the lower edge of the cell to the dorsal margin, and which may possibly have been overlooked." In other words, the apical vein of my figure being made furcate, the neuration of the fore wings is identical with that of *Heliodines* as represented in Mr. Stainton's figure. But the form of the wing of *Aetole* is narrower and it is more distinctly caudate. The hind wing in Mr. Stainton's figure is also wider and the median gives off a branch which is wanting in *Aetole*. These small differences, however, are perhaps unimportant, and it is more than likely that *Aetole* Cham. is the equivalent or American form of *Heliodines* Stainton ; and this view is supported by the ornamentation.

Lord Walsingham's descriptions are accompanied by two plates containing twenty-eight beautiful figures of the species described, with illustrations also of the neuration of the wings and form of the head and its appendages, of *Phryganeopsis brunnea* and *Eucerotia securella*, and is a most valuable addition to our knowledge of the American *Tineidæ*. Every one interested in the group owes him "a vote of thanks," and hopes that he will persevere in so good a work, and not abandon it as the writer of this has reluctantly been compelled to do.

NOTE ON BASILARCHIA.

BY A. R. GROTE.

Some time ago, in speaking of the discovery of Mr. Gray of intermediate specimens showing a connection between the species of *Basilarchia* (published in the CAN. ENT.) I suggested that *arthemis* was the older form, a view which I have recently been glad to know is held by Mr. Scudder. In examining Southern specimens of *ursula* or *astyanax* and *Eros* (the latter the Southern form mimetic of *Danais)* I think it possible that *Eros* stands in a nearer relation to *astyanax* than to *archippus*, although the latter is a prevalent form in Alabama. In studying this group we seem really to have to do with series of individuals scarcely hardened into species. It will I think be the most profitable genus to take up in connection with developmental studies. We have here a group which seems to exhibit the effect of various outside forces upon a comparatively plastic organization, and can thus measure perhaps the extent of the different influences brought to bear in moulding external characters in our butterflies. How much climate, selection and mimicry can effect may be here determined, and which works quicker or at the shorter distance in succession. It will be very interesting if the facts bear out the offspring of *Eros* from *astyanax* as well as *archippus*, and not the two "mimetic" forms from each other.

ENTOMOLOGICAL NOTES.

LACHNOSTERNA FUSCA.

At the last meeting of the Entom. Soc. of Ontario, Mr. J. M. Denton reported that he had seen near Delaware, Co. Middlesex, Ont., a ten-acre pasture field almost destroyed by the larvæ of this beetle, and he exhibited some specimens he had brought. The roots of the grass were completely eaten through, and the sod on being lifted came away easily in large patches, showing the larvæ underneath at their work of destruction. The owner of the land said that this spring the beetles were hovering in dense swarms over the pasture.

Melitaea phaeton, generally very rare here, was more abundant this spring. I found the larvæ feeding on *Gerardia pedicularis;* afterwards I obtained eggs from confined females and found eggs out doors on same plant. The eggs hatched. The larvæ therefrom, and additional larvæ found out doors, feed on the above-named plant, and developed and spun up as Mr. W. H. Edwards has it in his Butterflies of N. A., vol. ii., part 4.

There grows another *Gerardia* here, the *G. purpurea*, on which the larvæ of *Junonia coenia* feed.

Callidryas eubule is found here in a few specimens every year; last year fresh specimens were in great abundance.

Terias mexicana (worn).—I have captured a small and a large specimen of this species during several years collecting.

AUG. W. HOFFMEISTER.

Ft. Madison, Lee Co., Iowa, Sept. 7, 1881.

BOOK NOTICE.

The Canadian Sportsman and Naturalist, Vol. 1, Nos. 1 to 8.

This is a monthly journal published in Montreal, and edited by Wm. Couper, a well known naturalist and sportsman. Each number contains eight pages of matter arranged in double columns, printed in first-class style and on good paper. The articles are short and interesting, treating mainly of matters pertaining to hunting and fishing, with brief descriptions of Canadian wild animals, birds, etc.

The editor's extensive experience and travels in the Lower St. Lawrence is manifest in his articles on the rivers of that district and their products. Entomology also comes in for a share of attention. The fifth number contains a valuable contribution from Dr. J. H. Garnier, of Lucknow, Ont., on the reptiles of Canada, a subject to which but little attention has yet been given in this country, but one in which there is a large and promising field for the enterprising investigator. To all lovers of sport, either with the rod or gun, this journal will commend itself. It should also be of value to all who are fond of natural history in general. We hope to see it liberally supported. The subscription price is one dollar per annum.

The Canadian Entomologist.

VOL. XIII. LONDON, ONT., OCTOBER, 1881. No. 10

ANNUAL ADDRESS OF THE PRESIDENT OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

To the Members of the Entomological Society of Ontario.

GENTLEMEN,—While Entomology may be said to deal with small things, the abundance or scarcity of the tiny creatures called insects involves great issues. The truth of this statement has been illustrated forcibly in several directions this year, notably in the case of the Angoumois wheat moth, which has played sad havoc among the stores of corn and wheat in granaries in the South-western States. It is said to have destroyed many thousand bushels of grain, and so widespread has the evil become that it is the opinion of the New York Sun that if the Government or the farmers of America could at this time arrest the progress of this insect by expending five millions of dollars, it would be the best investment ever made by the people.

The Angoumois grain moth, *Butalis cerealella* Oliv., is a small moth the larva of which is very destructive to all sorts of grain. The female lays her eggs on the grain sometimes in the field before it is fully ripened, but more frequently in the bins in the granary. The eggs are of a bright orange red color, and in a few days there issue from them very minute whitish-colored worms, scarcely thicker than a hair, which bore into the grain and occupy it, one larva in each kernel. Each kernel contains sufficient food to support one occupant until it reaches maturity, when it changes to a chrysalis within the grain, which, although hollowed and almost entirely consumed within, appears outwardly sound and plump. On pressing between the fingers the grain is found to be soft and yielding, and when dropped into water it floats on the surface.

When the larva is full grown it spins a white silken cocoon, which occupies one end of the cavity within the grain, the other end being filled with the castings of the worm. The moth makes its escape through a small round hole in the side of the grain, which the larva cuts with its jaws before spinning its cocoon. When preparing this orifice for the

escape of the future moth the larva is careful not to cut entirely through, but leaves a thin tissue-like skin unbroken, which the moth finally ruptures when it makes its escape. The body of the moth is about one-third of an inch long, and its wings when spread measure about two-thirds of an inch across; the fore wings are of a plain brownish-buff color, with a satin-like lustre; the hind wings above and below, as also the under side of the fore wings, are blackish-gray.

This insect is a native of the warmer parts of Europe, and has long been very destructive in France. It was introduced into the southern portion of the United States more than 100 years ago, where it has become fully naturalized. It is often brought into New York in cargoes of grain, but the climate of the Northern United States and Canada appears to be too cold to permit it to thrive amongst us, or to permanently establish itself. It has never yet, to my knowledge, been found within the limits of our Province.

The Chinch Bug, which, although always present in our midst, has happily never yet proved a serious trouble with us, has been very destructive to the corn crop in Missouri and Kansas, and combined with the drought, has seriously affected the yield of this cereal in those States.

The Army Worm has appeared during the season in some portions of the West, and inflicted much damage; and there were good reasons for anticipating trouble from this source in our own Province next year, unless the exceptional drought we have lately experienced, and which has been generally looked upon as an unmitigated evil, should check their natural increase. The Army Worm, in common with many other of our night-flying moths, is double-brooded, but whether the later brood pass the winter in the larval or chrysalis state has never been fully settled. It is probable that with us the bulk of the brood pass the inclement season in the larval condition, the young larva burrowing into the ground for protection during the extreme cold of winter. It has been observed by Entomologists that an unusually wet season which induces a free growth of vegetation is very favorable for the sustenance of these pests, and if preceded by a dry autumn, which appears to have the effect of disseminating the moths over a wider area, the worms are often met with in great abundance. During this summer the Army Worm moths (*Leucania unipuncta*), which are always present with us to a greater or less extent, have been unusually abundant in the western portion of our Province. To the sugar-bait, employed by Entomologists to attract night-flying

moths, these insects have flocked by hundreds, and this has been observed not only in Ontario, but also in the Western States, showing that this moth has been unusually abundant over an extended district. Millions of their eggs must have been deposited on the leaves and stems of grasses, but the intense drought we have had has probably deprived the newly-hatched larvæ of the food necessary to their existence, and we may hope that the evil we have suffered from in the way of drought has saved us to a great extent from serious invasions of Army Worms next year.

Much attention has been paid of late by Entomologists to the natural conditions which favor or prevent the increase of injurious insects ; and I think there is good ground for expecting, after a few more years of close observation, that it will not be difficult to prognosticate, with a large measure of accuracy, several months in advance, the probabilities as to the insect pests likely to prevail during any year in any given district. When this can be satisfactorily accomplished, much practical good may be expected to result therefrom, since by avoiding the planting of such crops as are likely to be especially injured by insect hosts, and growing others comparatively free for the time from these troubles, a large saving may be effected.

During the summer a small moth, well known to Entomologists as a common insect throughout the Northern States and Canada, but never before recorded as destructive anywhere, has invaded the pastures in some parts of Northern New York, and inflicted great injury. It is a species of Crambus, *Crambus vulgivagellus*. The Crambidæ are known by the common name of grass moths, from the fact that as far as is known they all feed in the larval state on grass, and hence the moths are found everywhere in meadows, flying about in the daytime, with a short but rapid flight. The moths are small, with narrow front wings, which are usually ornamented with metallic spots and stripes. It was about the middle of May that a serious invasion of what was popularly supposed to be the Army Worm, occurred in St. Lawrence County, New York. The State Entomologist, Prof. J. A. Lintner, at once visited the scene of destruction and found the injury widespread and serious, extending over eight of the northern counties. Hundreds of acres of grass presented a brown appearance, as if winter-killed. A pasture lot of ten acres which, ten days before, offered good pasture, was so thoroughly destroyed that in many places not a blade of grass could be seen to the square yard. The upland pastures were first attacked and entire fields were laid waste in ten

or twelve days. Unlike the Army Worm, the caterpillars were seldom seen, and never observed actively feeding, and it was believed by the farmers that they fed at night, or by drawing the blades of grass into their subterranean retreats. In two instances the larvæ were observed in immense numbers collected on the trunks of trees so that they could have been scooped up by handfuls. The cause of their congregating at these points could not be conjectured; it was not for feeding on the foliage, for the grasses alone are their natural food. The caterpillars were slender, cylindrical worms, about three quarters of an inch long, of an obscure greenish color, with shining black heads. They were destitute of lines or other ornamentation, excepting some small, warty spots on their upper side. Early in August the moths began to appear, when they were identified as specimens of *Crambus vulgivagellus*, the new enemy proving to be an inconspicuous and hitherto unobtrusive little Crambus. It is quite probable that several accounts of injuries to pasture lands in the New England States during the last three or four years by some unknown depredators are to be credited to this species.

At a late meeting of our Entomological Society, held in London, one of our members, Mr. J. M. Denton, referred to the injuries which were at that time being inflicted on some pasture lands within a few miles of London by the larva of the common May Bug, *Lachnosterna fusca*, and exhibited specimens of their work. He had found whole fields of pasture land with the roots of the grass so eaten that the turf could be readily lifted with the hand by the yard, and underneath were thousands of these grubs feeding on the remaining fragments of roots. In one instance, near the village of Delaware, a field had been so completely destroyed that the farmer had set fire to the withered grass with the hope of scorching the enemy to death. As these larvæ readily burrow in the ground when disturbed, he was advised to adopt a different method and turn his hogs into the field to root amongst the grass and devour the larvæ, which they greedily consume in immense numbers. Such wholesale destruction by this insect is not common, but when it does occur it is very alarming.

In the tenth annual report of the State Entomologist of Illinois, just received, mention is made of a new insect injurious to corn. This is a small beetle closely allied to the common striped Cucumber Beetle, and known to Entomologists under the name of *Diabrotica longicornis*. In Illinois the damage caused by the larva of this insect has been considerable. They are small white worms about half an inch long and very

slender, which attack the fibrous roots of the corn, and so destroy them that the plants may be pulled up very easily with the hand. After a time the plants begin to wither and the grain fails to mature. In some instances it is believed that the injury inflicted by this tiny creature would result in the loss of fully one-third of the crop. The perfect beetle is about one-fifth of an inch long, with a width scarcely equal to half its length, and of a pale, dull greenish yellow color without spots or stripes.

The general alarm which prevailed several years ago in reference to the Colorado Potato Beetle seems now to have to a great extent subsided, and notwithstanding that the insect has been very abundant in some sections, it has not been so generally injurious, and where it has appeared in abundance prompt remedial measures have been successfully employed. It has been claimed, and, I suppose, correctly so, that this pest originally came from the canons in the Rocky Mountains, in the State of Colorado, where it is said to have fed on some wild species of Solanum growing there. It was my privilege during the latter part of August of this year to spend a week in this district, and while there I travelled fully one hundred miles through those canons. Several species of wild Solanum grow in abundance almost everywhere in the adjoining plains as well as in the canons, and every opportunity was embraced of examining them, but in no instance could I detect any evidence of the presence of the Colorado Potato Beetle in any of its stages. Besides, I saw several potato patches, and these also seemed quite free from any insect trouble. This seemed to me not a little singular in view of the extremely prolific nature of the insect. Can it be that it has migrated so completely as to leave over large areas no representatives behind, or have its natural enemies so increased as to almost annihilate the pest? Our farmers here would, I am sure, gladly hail the advent of either of these agencies should it free them from this troublesome insect.

The question of the use of the most suitable and economical poisons for the destruction of injurious insects still attracts much attention, and Paris Green continues to head the list as the most generally useful, notwithstanding the efforts which have been made by interested parties to replace it by London Purple. London Purple is an arsenical mixture, a waste product, which accumulates during the manufacture of aniline dyes. Before its introduction as an insect destroyer it had no commercial value; on the contrary, the dye makers were at considerable expense and trouble in getting rid of it as it accumulated. Arsenic, which is the active

ingredient in this compound, is present in very variable proportions, which is just what one might expect in a waste product. Sometimes it forms less than twenty per cent. of the mixture, while other samples will contain more than forty per cent. It is associated chiefly with lime and coloring matter. The arsenic present is in a very fine state of division, and intimately mixed with the lime and other ingredients, forming a very fine powder. It is much more soluble than Paris Green, and hence more liable to scorch the foliage, while its very variable strength makes it uncertain in its effects. For these reasons London Purple is not likely to take the place of Paris Green as an insecticide, which, when unadulterated, is nearly uniform in its composition and effects. An artificial mixture of arsenic and lime of uniform strength and colored could be supplied at about the same price, and would be more reliable than London Purple; but owing to the more ready solubility of the arsenic in this form and its caustic character, it is apt, unless used with much care, to destroy portions of the tissues of the leaves on the plants to which it is applied, making them appear as if scorched or burnt.

Experiments have been carried on for the past two seasons at the Agricultural College at Lansing, Michigan, by Prof. A. J. Cook, on the use of London Purple as a remedy for the Codling Worm. Early in the summer, while the fruit was quite small, some crab apple trees were syringed thoroughly with London Purple mixed with water, and it is claimed that the poison, which, when the water has evaporated, forms a thin coating on the fruit, either prevents the Codling Moth from depositing her eggs or else poisons the young larvæ as soon as they are hatched, the result being the saving of a very large proportion of the crop from injury, while other trees near by not similarly treated bore very wormy fruit. It is also said that, as the fruit approaches maturity, the most delicate chemical tests fail to show a trace of the poison. I scarcely think that the experiments yet tried in this direction have been sufficiently extended to warrant any general conclusions being based on them, and provided it were proven that this remedy was a certain and safe one, the popular prejudice against applying such virulent poisons directly to the fruit we are to eat would be so strong as to prevent the general use of any such means. Indeed, were it generally known that the apple growers of any district were in the habit of applying arsenic in any form directly to their fruit, it would interfere very seriously with their sales, and it is doubtful if apples so treated would find a ready market anywhere.

It is well known that the seeds of certain noxious weeds will sometimes lie dormant in the soil for almost any number of years, awaiting a favorable opportunity for germinating; but it is not so generally known that the development of insect life is sometimes similarly retarded. It has many times been observed that a few individuals out of a large brood of moths will remain in the chrysalis state over one season and produce the perfect insect the following year, thus remaining a full year more in the dormant condition than is usual, and instances are on record where the perfect insects have escaped after three years spent in this condition of torpor. Recently, Prof. Riley, of Washington, has called attention to a very remarkable case of retarded development in the eggs of the destructive Rocky Mountain Locust, *Caloptenus spretus*. These eggs were laid in 1876 on the grounds of the Agricultural College at Manhattan, Kansas. While grading the ground around the chemical laboratory in the autumn a quantity of the eggs were buried some ten inches below the surface, the covering material being clay, old mortar and bits of stone, and above this a plank sidewalk. On removing and regrading the soil last spring a number of these eggs were disinterred quite sound and fresh-looking, and when exposed to normal influences they readily hatched, so that these locusts' eggs actually remained nearly four years and a half in the ground unhatched, or four years longer than is their wont. How much longer they would have retained their vitality under favorable conditions of temperature and dryness is unknown. This point has a very practical bearing and deserves further investigation, not only in reference to the eggs of this insect, but to those of all injurious species whose eggs are deposited on or under the ground.

The Sub-Section of Entomology of the American Association for the Advancement of Science met this year at Cincinnati, Ohio, where I had the honor of representing our Society. A large number of distinguished Entomologists were present, and many useful papers read and discussions held at the meetings. An account of the proceedings will appear in our Annual Report. It having been decided to hold the next meeting of the American Association in Montreal, I trust that our representative men in all departments of science will be present to greet with a hearty welcome the distinguished scientists from the United States and abroad, who will on that occasion honor the Dominion with their presence. I have strong hopes that the Entomologists of Canada will turn out in good force.

If the progress of a science is to be indicated by its literature and the

number of its devotees, then Entomology has made very rapid progress within the last two or three years. There are on this continent now nearly 500 persons pursuing the study of this important branch of natural history, and during the past year a large number of original papers have been published on the subject. The CANADIAN ENTOMOLOGIST, the monthly organ of our Society, continues to hold its place in the front rank among the most useful periodicals in this connection, while clustering around it now are Psyche, the organ of the Cambridge Entomological Club; the Bulletin of the Brooklyn Entomological Society; and last, though by no means least, Papilio, a journal devoted exclusively to lepidoptera and mainly to descriptions of new species, which has now completed its seventh number. All these are devoted exclusively to Entomology, and will be found of great value to every Entomologist. To these must be added the valuable reports of the U. S. Entomological Commission, whose good work is still being continued; the annual reports of the Entomologist of the Department of Agriculture at Washington, those of the several State Entomologists, the annual report of our own Society, as well as a large number of papers on the subject to be found in the transactions and proceedings of all natural history societies. There has also appeared in the Canadian Sportsman and Naturalist, edited by William Couper, of Montreal, some Entomological items of special interest to Canadian Entomologists.

In my last annual address I referred to the appointment by the Ontario Government of a Special Commission to enquire into the agricultural resources of the Province, and the progress and condition of agriculture therein. In view of the important bearing of Entomology on successful agriculture, the Government was pleased to appoint your President as one of the Commissioners. The report of the Commission has since been compiled and published, in which the insects injurious to the farmer and fruit grower have been fully dealt with; also the remedies suggested for their destruction, and the beneficial insects which prey upon them. The evidence relating to the subjects of insects and insectivorous birds occupies 104 pages in the full report, and 61 pages in the condensed report, both of which are adorned with many excellent illustrations. The eagerness with which these publications have been sought after is indicative of the estimation in which they are held by the public. It would, I think, meet a strongly felt want if some arrangement were made whereby this valuable work, so useful to every farmer, might become accessible by

purchase to all who are seeking for it throughout the length and breadth of our Dominion. I have the honor to be,

yours very sincerely,

WM. SAUNDERS.

ON THE LENGTH OF LIFE OF BUTTERFLIES.

[Read before the Ent. Sub-Section of the Am. Ass'n at Cincinnati, 19 Aug., 1881.]

BY W. H. EDWARDS, COALBURGH, W. VA.

Not long since I received a letter from a correspondent in Europe, asking what my experience was in regard to the life of butterflies, and this led to much thinking of the matter and reference to my note books, in which for more than fifteen years I have put down everything that has come under my observation relating to butterflies. The current opinion has been that the life of such butterflies as did not hibernate was short, and that in case of hibernators their existence ended soon after copulation in the ♂, and after laying their eggs in the ♀. Dr. Boisduval says, Spec. Gen., 1, p. 28: "The existence of lepidoptera in the perfect state is generally of brief duration; the male perishes some days after copulation and the female after having finished her laying of eggs." Kirby and Spence, Introd., London, 1856, p. 41, say of the perfect insect: "Its almost sole object is now the multiplication of its kind, from which it is diverted by no other propensity; and this important duty being performed, the end of its existence has been answered, and it expires."

I believe that this is a correct statement for a general one. On the other hand, Mr. S. H. Scudder, in various publications, has spoken of butterflies of the summer generations as living for months—2 to 3 months at least.

With regard to the hibernating species, I believe it is the last brood only which hibernates, so that the individuals begin their existence about the month of September. They lay eggs in the spring as soon as the food plant is ready to receive them, and shortly die. Therefore their existence would be limited to 8 or 9 months at the outside. Per contra, Mr. Scudder asserts that Danais *Archippus* lives from a year to 15 or 16 months.

It is not possible to say of butterflies at large exactly when one came from chrysalis, or when it expired, but in the case of any species we observe at a certain time of the year, with great regularity, fresh butterflies are on the wing, and that in a few weeks only here and there can this species be seen, the survivors being old, abraded of wing and broken. If a female be now taken, on dissection there will usually be found a few eggs in the abdomen, perhaps half a dozen, the remains of an original stock of 200 or more. Sometimes not a vestige of the eggs remain. Any collector much in the field will often have seen female butterflies on the ground, sometimes struggling, oftener dead, and if examined these will usually show no sign of violence, but plenty of old age and exhaustion.

In the case of many-brooded species we observe that, periodically, every few weeks a new brood has come, then that the butterflies are old and scarce, and suddenly great numbers of fresh ones are flying. So that in a certain number of weeks a whole generation has come and gone. But the individuals of this generation which emerge earliest, and lay their eggs soonest, will die first, and as the emergence occupies at least half the whole period of the generation, we may say, if a generation is on the wing six weeks, that three or four weeks would be the limit of existence of any particular individual. In many species, in the latitude of West Virginia and further south, there is a new generation on the wing every month, and in such case a butterfly three weeks old would be a patriarch among its kind. In New York and New England, where most species are double-brooded at least, the duration of an individual life may be a trifle greater, but no more, depending upon the time the eggs are laid.

In the case of a seasonally-dimorphic species, and still more of a trimorphic species, like Papilio *Ajax*, we can fix the limits of duration of one or more of the forms with some definiteness. In my section of West Virginia the form *Walshii* is on the wing very early; *Telamonides* appears about a month later, but occasional *Walshii* fly as late as any *Telamonides;* and by first of June the third form, *Marcellus*, appears, and almost at once completely supplants the other two. In a few days not an example of the other forms will be seen. I find many memoranda in my note books bearing on this point.

In a series of years, from 1871 to 1881, the first appearance of all the forms of *Ajax*, and the last appearance of the two spring forms, is recorded nearly every year.

	Walshii.		Telamonides.	
	Earliest.	Latest.	Earliest.	Latest.
1871.		24 May.	24 May.	9 June.
1872.	11 April.	19 May.	29 April.	30 May.
1873.	8 April.			
1874.	27 April.		14 May.	6 June.
1875.	7 April.		27 May.	
1877.	23 March.	15 May.	18 May.	
1878.	9 March.	15 May.	3 May.	
1880.	March, early in	30 May.	19 May.	
1881.	19 April.	21 May.		

Marcellus.
Earliest.
1871. 1 June.
1872. 5 June.
1874. 6 June.
1880. 30 May.
1881. 7 June.

So that *Walshii*, during a period of eleven years, has been seen as early as 9th March, and as late as 30th May ; and *Telamonides* as early as 29th April and as late as 9th June. In the one case there has been a range of 92 days, in the other of 41. The first appearance of *Walshii* depends altogether on the state of the weather. If a few fine days come early in March, some individuals will surely be seen long before the bulk of their generation ; and these early comers are invariably cut off by the severe weather which follows. *Walshii* is in fact an April form here, while *Telamonides* is scarcely ever seen in April, but is a May form, not descended from *Walshii* of the same year, but like *Walshii*, coming from over-wintering chrysalids of all three forms of the preceding year. After 1st June, *Marcellus* coming from the eggs of *Walshii*, laid last of April and early in May (before which time the food plant Pawpaw, Anona triloba, does not put forth the first flower bud or leaf bud) abounds, and continues in successive generations till late in the season.

During the middle of the *Walshii* period many females may be seen, worn and broken, evidently some time out of chrysalis, and in their last days. In 1871, 10th April, I recorded that I took 3 ♀ *Walshii* "battered and broken." Whereas, a few days later, on 16th April, I took 4 fresh ♀. One half the generation was passing away while the other was

coming on. A large proportion of these early females must die before the leaves of the Pawpaw first show themselves. In this plant the flowers precede the leaves, and these larvæ do not eat the flower, but eggs are sometimes found on the unopened flower buds and even on the stems, several days before the bursting of the leaf buds.

In 1880, 9th April, I recorded that no good examples of *Walshii* were to be had, all being worn and broken. But same year, on 20th April, I took a pair of *Walshii* in copulation, the ♀ just out of chrysalis, the wings expanded, but still limp—not wholly dried—the ♂ old and broken. Next day I took 3 pairs of same form in copulation, and in each case the female was fresh, while the male was worn and broken.*

Now in that year the first *Walshii* had been seen early in March. On 1st day of April I took a ♀; on 3rd April I recorded that I saw several females about the blossoms of the wild plum and that all were worn. Plainly one division of this generation, in the ♀, was passing away early in April, while 20th April many fresh females were coming from chrysalis. I took all these pairs in one clump of bushes inside my fence, and it is to be presumed that if plenty there, multitudes of *Walshii* were coming from chrysalis throughout this region on those days. The weather had suddenly changed from cold and blustering to fine, and the belated chrysalids were giving butterflies.

The period of *Telamonides* in these same years has been from 29th April to 9th June. In 1871, 9th June, I recorded that I confined 2 ♀ *Telamonides;* on 10th had got no eggs, and concluded from their wasted appearance that they had previously exhausted their stock. That same year, both on 24th and 28th May, I had taken females of *Telamonides* while ovipositing. On 12th May, 1872, I recorded that I shut up a ♀ *Telamonides* and got eggs; on 30th May, that I shut up 2 ♀; and add that many of this form were to be seen, but all were worn. *Telamonides*

* I have again and again noticed in many species of butterflies, where a pair have been taken in copulation, that the male will in most cases show signs of considerable age, while the female is evidently either just from chrysalis or quite recently. Boisduval, Spec. Gen., 1, p. 28, says: "In some instances two or three days elapse between chrysalis and pairing, but only when the sexes cannot come together sooner." But of the hibernators the same author says of the Vanessidæ, all which in temperate regions at least hibernate in the imago: "Their pairing does not take place till seven or eight months after the emergence of the insect." Of my own experience I know nothing as to this.

emerges after the weather is settled, and its extreme period as observed has been 41 days, during 11 years. But in any one year it has been but one month. In 1872 the first were seen 29th April, the last 30th May. So that I doubt if any individual *Telamonides* is alive longer than three weeks.

Marcellus ♀ lays its eggs very soon after chrysalis. The eggs are in part fully formed when it emerges from chrysalis. I dissected a female a few hours after chrysalis, which emerged in my room 13th July, 1881, and found some of the eggs round and deep green (the color when laid), but not hardened externally; others were nearly formed. In *Walshii* it is different, the eggs being at first fatty masses without form. I dissected one of the females taken 21st April, 1880, before spoken of. This was just from chrysalis and in the act of pairing, but the eggs were wholly unformed. The same thing is true of *Telamonides*.

The eggs of *Ajax* are laid during several days. The female flies from leaf to leaf and deposits one at a time, and as some scrutiny is exercised, one leaf being selected while another is refused, much time is lost. So that several days may be occupied in laying 200 eggs—perhaps a week. And by this time the insect will have become worn and the wings broken. She cannot possibly exist many days after the laying is finished. That the eggs are either all mature together, or mature with great rapidity, is evident from the ease with which they are obtained in this species from females tied in a bag over the food plant. They usually lay at once and in large numbers. I noticed particularly the condition of *Walshii* and *Telamonides* during the last days of May, 1881. All were old and the males much exceeded the females in number, I should say ten to one. In 1880, 30th May, the last *Walshii* seen that year were two old males. It seems to me probable that many males never have the opportunity of pairing, and that these live longest, their lives enduring much beyond that of any female. The latter is discovered almost as soon as out of chrysalis, and several males at same time may often be seen fluttering about one female. The young males stand no chance at all in competition with the older ones. The former are for some hours limp and weak, and by the time they have attained their strength, the eager crowd of suitors, who are prying in every bush in quest of a mate, have carried off the prize. But when there are no old males, the young one may certainly pair a few hours after chrysalis. I have seen this in Argynnis *Idalia*, when a limp female was taken with a male absolutely perfect in wing and thorax, and

therefore but lately out of chrysalis. So in Argynnis *Myrina*, where I took a pair in copulation both which had emerged in my boxes the previous night. How speedily the males expire after pairing I cannot say; they certainly do sometimes during the process. In 1872, 25th April, Mr. Mead, here at Coalburgh, took in his net a pair of *Ajax* flying by, and found the male not merely dead, but dry, and evidently it had expired many hours before. As I have said, both Boisduval and Kirby and Spence state that the males die very soon after pairing

I think from what I have said, it will be evident that Papilio *Ajax*, which from its size and strength would seem as likely to live several months as any butterfly in our fauna, really does live but a few weeks, and probably not more than three or four, unless in case of males which have not paired; even then but a trifle longer.

Take Lycaena *Violacea*, a dimorphic species of which *Violacea* is the early form and *Pseudargiolus* the later. During 17 years past I have kept record of the first appearance of this Lycaena because it is the earliest butterfly of the year, and the harbinger of spring. The earliest date has been 17th February, and the latest date of first appearance has been 7th April. But except in one year, 1876, the earliest examples seen have been on 6th March. No flowers are in bloom so early, and the Dogwood (Cornus), on the flowers of which *Violacea* deposits its eggs, does not usually begin to put forth its flower buds till about middle of April. The eggs are not formed when the females come from chrysalis, nor till several days have passed. In 1878, 7th April, I dissected a ♀ and found no eggs. The same day the Dogwood was in bud, but I found no eggs after a long search. On 13th April I confined a ♀ over a limb of Dogwood and got 40 eggs. On 16th April, 1880, I took a pair of *Violacea* in copulation, and 17th found the first eggs of the season, though I had been watching daily for them.

On 26th April, 1881, the buds were still unopened but formed, and I found the first eggs on them. In 1879, 27th April, I found eggs, but no young larvæ. Three days later there were scores of eggs, seven on one flower head, but still no larvæ. On 1st May the larvæ were hatching.

Up to the time of laying eggs fresh males and females are to be taken and I repeatedly record this. The latest mention of *Violacea* is on 6th May in one year, when two or three were seen.

The next generation, *Pseudargiolus*, come from eggs laid by the early form, *Violacea*, in these years has been first seen once on 19th April, once

1st May, but in the other years from 7th to 22nd May, their advent depending on the season, and on the date of the previous flowering of the Dogwood, i. e., the laying of eggs by *Violacea*.

The life, therefore, of Lycaena *Violacea* must be limited to three or four weeks at the utmost, and shortly after oviposition this form completely disappears.

There are some species which live but a short time at a particular season of the year, and being single-brooded, pass the greater part of the year in chrysalis. Of such is Anthocharis *Genutia*. I find its earliest appearance at Coalburgh recorded on 17th April, its latest on 14th May, in a series of years.

So Thecla *Henrici;* year after year I record its appearance in April, and in no other month. The earliest seen have been on 11th, the latest 29th April.

For an example of a hibernating butterfly we can have no better example than Danais *Archippus*, and it is the one which Mr. Scudder finds so remarkable in its longevity. It is of large size, and therefore readily distinguished, and is cosmopolitan. In West Virginia there are at least four, and possibly there are five generations of the imago of this species in succession, and it is the last generation which hibernates. Very early in the spring a few of the survivors may be seen about the blossoms of the peach or wild plum trees. About first of May, the leaves of the larval food-plant, Asclepias, begin to show themselves, and at once the females of *Archippus* seek them in order to deposit their eggs. I have watched carefully to see how late these old hibernating females were flying, and the latest date was 2nd June, when I took one. This I dissected, and found the abdomen free from eggs, all having been laid. Also I watched all through the season of 1878 to see what sort of females laid eggs. I had the best possible opportunity, as Asclepias abounds near my house and comes up all through the grass hereabouts. So in the lanes and along the brooks it grows in profusion, and young plants continue to come up quite into September. In every instance the ovipositing female was fresh colored, plainly not long from chrysalis. One generation of the butterflies succeeded another the season through. The first brood of larvæ raised by me came from eggs laid 2nd May. These eggs were found on the plants, and must have been laid by a hibernating female. The butterflies began to emerge from chrysalis 30th May, several days after fresh individuals of the same or first generation were observed flying abroad.

The second brood came from eggs laid 1st June. I saw the female ovipositing, caught her and confined in bag over a plant, and got many eggs. This female was nearly perfect, and not long from chrysalis. (It was on the next day, 2nd June, that I caught the hibernating female before spoken of.) The butterflies from this brood began to emerge 25th June.

The third brood raised by me came from eggs laid 29th–30th July, by a fresh female, confined as before. (During the interval between 25th June, when the previous brood began to emerge from chrysalis, and the 29th July, when these eggs were laid, there was plenty of time for an additional brood.) The butterflies began to emerge 20th August.

The fourth brood raised by me came from eggs laid 30th August, and the butterflies from these began to emerge 29th September.

Now plainly the history of *Archippus* does not differ from that of any other many-brooded species, except that in some the chrysalis hibernates, while in others it is the imago.*

I could adduce other instances, as Argynnis *Cybele*, Satyrus *Alope*, Apatura *Celtis*, Limenitis *Disippus*, etc., but I have given enough to show that butterfly life is of short duration; that in the summer generations it cannot exceed a few weeks, and that in all cases it probably terminates shortly after copulation in one sex, and oviposition in the other; and that the current opinion on the subject among lepidopterists is correct.

NOTE.—I learn from Prof. Lintner that *Archippus* is three-brooded in New York. It may be so in the lowlands, and in the mountains be but double-brooded. But whatever the number of broods, the behavior of the species will be the same in one place as in another. This butterfly being cosmopolitan, adapted to all climates except the arctic, with a wide range of flight in the individual, often migrating indeed from one region to another, we may be sure that the length or the shortness of the season in special or in any localities cannot possibly effect a radical change in its habits. Therefore it was with much surprise that I read the following statement gravely propounded by Mr. Scudder, in Psyche for July, 1875, respecting this species, under the name of Danais *Plexippus*: "In North

* To show how readily *Archippus* lays its eggs in confinement, on 19th August, 1879, I tied a female over Asclepias, and within 24 hours had gotten 82 eggs. This also shows that the eggs mature for deposition, not singly, but *en masse*. Fourteen days later the larvæ from these eggs were pupating.

America" (not, be it observed, in one part of it, but everywhere) "*it is single-brooded* (not double-brooded, as asserted by Mr. Riley), the butterflies hibernating. It leaves its winter quarters later in the season than other hibernating butterflies, *and continues upon the wing until July and August, laying eggs all the time,* SO THAT *the insect may be found in its earlier stages throughout most of the summer*"; and "*the perfect insect lives a full year, mingling on the wing with its own progeny, and witnessing the decay and renewed growth of the plant which nourished it.*" That is to say: the caterpillars of *Archippus* which may be found throughout most of the summer come from the eggs of these old hibernating females, and not from young females of a new generation. These last are compelled to go over winter before they can lay eggs. It follows that females hatched from the early eggs of one season must or may exist till the close of the following season, and therefore live not merely a full year, but a year plus the time from June till September.

I knew enough of *Archippus* to be assured that it had a history in no way peculiar in respect to its propagation. No butterfly on earth has a habit such as is above stated, and the author would seem to have had in his mind something quite outside of lepidoptera. But that I might be able to speak with precision, I carefully made observations reaching through the whole season of 1878, and which I have just recited herein. These were published at length in Psyche, Dec., 1878, and showed conclusively that in one part of North America the hibernating females came early from their winter quarters, began to lay eggs at first sight of the food plant, and were extinct soon after. Therefore that the hibernating female was not laying her eggs all through the summer, and did not give birth to the succession of fresh butterflies of that season. But it was clearly shown that the eggs of the hibernating female produced the first generation of butterflies, and that females of the first produced the second, the second the third, and so to the end.

I was considerably more surprised, therefore, on reading Mr. Scudder's recent book, "Butterflies," 1881, on page 136, to find this story repeated word for word, with no allusion to my published history or to the observations of Mr. Riley or any other person, and with no verification on the author's part or data whatever. The first account might have been excused in an author of restricted experience in the field, contriving in his closet a theory which should explain imperfectly observed phenomena, but what shall be said of its subsequent repetition, without note or com-

ment, after an interval of years! "It is the longest-lived of our butterflies"; "continues upon the wing until July and August, laying eggs all the time"; "the perfect insect often lives a full year, mingling on the wing with its own progeny, and witnessing the decay and growth of the plant which nourished it"!!

Throughout this book *Archippus* is ostentatiously called THE MONARCH, I apprehend in right of its amazing history. If it lives as long for a butterfly as Methusaleh lived among men, it may be entitled to some sort of distinctive appellation, and if it has so changed the habits of its kind as to breed like a mammal, laying eggs at intervals in the closing half of its long life, and gathering its progeny about its tibiæ, perhaps it ought to have some superlative title. We read that Methusaleh lived after he begat Lamech seven hundred and eighty and two years, and begat sons and daughters, but his long life appears to have been that venerable man's sole claim to distinction. We do not read that he attained regal honors, or even the chieftainship of a tribe. In view, therefore, of this high precedent, I suggest that the correct thing would have been to designate this long-lived, phenomenal butterfly not THE MONARCH, but THE PATRIARCH.

MEETING OF THE SUB-SECTION OF ENTOMOLOGY OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

(Continued from Page 189.)

On Saturday morning the Entomological Sub-section was again in session, when the following papers were read:

The Egg Case of *Hydrophilus triangularis*, by C. V. Riley; on the Oviposition of *Prodoxus decipiens*, and also one on the Cocoon of *Gyrinus* by the same author. Following these a paper was presented by B. P. Mann, entitled, Suggestions of Co-operation in Furthering the Study of Entomology; and another by C. V. Riley, on New Insects Injurious to American Agriculture.

In this latter paper the author called attention to several insects hitherto unknown as injurious, which during the present year have proved very destructive to one crop or another. Such hitherto unknown and unreported injury is either caused by, 1st, imported species; 2nd, native species previously known but without destructive habit; 3rd, unknown or

undescribed species. The author gave an account of the injury which had been done to clover plants by a beetle, *Phytonomus punctatus*, in Yates Co., New York. The cocoons of the beetles were found on the ground in the fields, but the beetles were difficult to find on account of their shyness, as they fall to the ground when approached. Mr. Riley also reported that much injury had been done to corn in South Carolina and Georgia by a borer which was probably the larva of a Pyralid moth.

After the reading of papers an informal discussion on Entomological subjects took place.

Mr. A. J. Cook remarked that *Heliothis armigera* had attacked corn in Michigan for the first time in 1880. That was a very wet year, whereas this year had been very dry, and this season the Army Worm, *Leucania unipuncta*, had been observed injuring it for the first time.

Mr. W. Saunders said that the imagos of the Army Worm, *Leucania unipuncta*, had been unusually abundant in Ontario during the summer, and had been seen at sugar in great numbers, and referred to the fact that the destructive brood of this insect was not the first brood. Mr. Cook had found the moths similarly abundant in Michigan.

Mr. Cyrus Thomas stated that he had positive proof that the eggs of *Leucania unipuncta* had been deposited in fields of oats. He also said that wet weather was very favorable for the development of this insect.

Mr. J. A. Lintner spoke of the great abundance of the Clover-seed Midge, *Cecidomyia leguminicola*, which was rapidly spreading over a large area. Mr. B. P. Mann considered that the rearing of insects in the house tended to prolong the life of the larvæ, and to shorten that of the pupæ. Mr. C. V. Riley agreed with him, but Mr. Thomas held the opposite view.

Mr. S. H. Peabody, speaking of the duration of life of some moths, remarked that in *Endropia* and in *Ctenucha virginica* the period of existence of the imago was short.

Mr. Riley said that *Anisota rubicunda* feeds on both the hard and soft maple trees, and that the coloring of the imago in the western limits of the region where the moth is found is very pale in color. Mr. J. A. Lintner stated that he had captured this insect at Schoharie, N. Y., having a yellow color with only a slight tinge of rose.

Mr. W. H. Edwards remarked that he had found *Thecla henrici* only in April. It feeds on the wild plum tree. The larva eats into the unripe plums, burying its head and shoulders in the fruit, and eats no other kind of food. The larva becomes full grown by the time that the plum has

become half grown. The insect has but one brood in the year. Mr. Edwards also remarked that *Lycaena violacea* feeds upon many different food plants.

The meetings of the Entomological Sub-section were throughout very interesting and profitable, and the "brethren of the net" separated with regret, the hope being expressed by all that they might be privileged to meet again next year in Montreal.

BOOK NOTICE.

Butterflies: Their Structure, Changes and Life Histories. By Samuel H. Scudder.

We are indebted to the author for a copy of this beautiful book, a well printed octavo volume of 322 pp., illustrated with 201 figures. The work is divided into thirteen chapters, the first six of which treat of the structure of butterflies in all the stages of their growth from the egg to the perfect insect. A chapter is devoted to the internal organs of caterpillars and another to the transformation of these organs during growth. The remaining chapters deal with the life histories of these attractive insects and the changes which they undergo under varying circumstances. Following these is an appendix containing instructions for collecting and preserving insects, etc., a list of the common and scientific names of butterflies, and a list also of the food plants of their caterpillars, all written in a plain and popular style. It is a great pity that a work of this character, coming from so well known and talented an author, and containing as it does so much useful and valuable information, should be marred by the introduction of a series of new names for our butterflies which to the great bulk of the Entomologists of America seems to be a most unreasonable imposition and against which their is a general feeling of revolt. That any author should persist in carrying the rules of priority so far as to resurrect old documents the authority of which is of the most questionable value, and on the strength of these insist on the changing of nearly all the names of our butterflies, is a tax on the patience of the practical man which few can endure, and a serious bar to the progress of our favorite science. Neither do we think that the introduction of a large number of newly invented common names will add in any degree to the popularity of Entomology; it were far better, in our opinion (with few exceptions), to use the specific name of the insect for this purpose, which is as easily learnt and conveys a more definite idea than is possible with such common names as those given by this author.

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ON THE LIFE DURATION OF THE HETEROCERA (MOTHS).

BY J. A. LINTNER, ALBANY, N. Y.

Read before the American Association for the Advancement of Science, at its Cincinnati Meeting, August, 1881.

I have been requested by Mr. Edwards, who has presented to the Association an interesting and valuable paper, "On the Length of Life of Butterflies," to supplement it with some remarks on the *Life Duration of the Heterocera.*

The period of time passed by insects in their perfect stage, is an item in their history to which, so far as I know, very little attention has been paid. It has not hitherto been made a special subject of inquiry. When we seek to answer the question, we find that very few of our published observations bear upon it. The little that is known upon this point, in the Heterocera, would not authorise the presentation of these notes before this body, were it not that a confession of our ignorance should, and I hope may, serve as an incentive to the examination of the interesting question.

It must prove a difficult field of investigation. Observations made upon species in confinement, deprived of food and subjected to other unnatural conditions, would give only approximate results. Even here we find our knowledge extremely limited. Outside of the Sphingidæ and the Bombycidæ, scarcely anything has been done by our Lepidopterists in rearing entire broods of species. In these two families the eggs can be easily obtained, either by the "sembling" method (attraction of the male by the exposure of a newly-emerged female), or by simply pinning a captured female. Several species of the Phalænidæ are quite prompt in extruding their eggs upon being pinned, even after having been temporarily subjected to anæsthetic influence. But in the extensive family of Noctuidæ—with the winged forms of which we are so familiar, and of which our knowledge, therefore, should be the more complete—it is difficult to obtain the eggs under the restraint of confinement. I have never

carried an oviposition of a single Noctuid to the perfect stage, nor can I recall a published record of its having been done. Further, in illustration of the veil that still hides portions of the life histories of these forms which rarely obtrude themselves upon our sight except under cover of the night, it may be mentioned that during the thirty years in which my studies have engaged me to a greater or less extent in the rearing of Lepidoptera, I do not recall an instance where I have observed the Noctuidæ *in coitu*, and therefore have no personal knowledge of the time, place, manner or duration of the initiative of Noctuid life.

It is known that in the Attacinæ, among the Bombycidæ, in confinement, the lives of the moths are very brief. The sexes mate a few hours after emerging from the pupæ, and continue in copulation for twenty-four hours or more. Oviposition may be commenced the following day, and completed within four or five days thereafter. Perhaps a week longer will complete the life period of the female—extending in all to about fifteen days. The male usually dies a few days after copulation—several days before the female.

In the Sphingidæ, the lives as observed, in confinement, are longer than in the Attacinæ, but I have no records from which to give comparative duration. Our observations upon the Phalænidæ lead us to believe that, as a general rule, their lives are shorter than are those of the Noctuidæ.

An approximation to the life period of the Noctuidæ may be obtained from the dates when the several species are observed abroad. The published records of the collections made by "sugaring" will furnish convenient data for this. I regret that at my present writing, away from books of reference, I am unable to refer to the papers of Messrs. Thaxter, Norman, Westcott* and others. From a paper published by myself in *Entomolog. Contrib.*, iv., pp. 43–51, it appears that the period of collection (embracing probably nearly the entire life period, as the examples when first taken at sugar were apparently just from pupæ, and those last taken so worn as to be hardly capable of flight) of quite a number of species was about one month. Among these may be mentioned *Habrosyne scripta*, *Agrotis baja*, *A. subgothica*, *A. bicarnea*, *A. repentis*,† *Hadena verbascoides*, *Gortyna sera*, *G. nictitans*, *Leucania pallens*, *L. phragmitidicola*, *L. lapidaria*, *L. pseudargyria*, *Orthodes infirma*, *Orthosia helva*, *Scoliopteryx libatrix* and *Pseudaglossa lubricalis*.

* *Psyche*, ii., pp. 34–38, 80; *Canad. Entomol.*, vii., pp. 3, 21; *Id.*, viii., p. 12.

† Now regarded as distinct from *A. messoria* Harris.

If, in consideration of the condition of the moths when captured, the probable different time of oviposition and more or less favorable exposure of eggs, we assume that the individuals of a species continue to emerge from the pupa during one-third of the above period, there will remain, as the approximate life duration of these Noctuidæ, *a period of three weeks.*

Mr. Wm. L. Devereaux, of Clyde, N. Y., in giving the results of his collections of Noctuidæ at sugar for two years,* states that "most of the species remain for about a month." From other data which I have consulted, I think that we shall not be far from the truth if we adopt as the life-period of the larger portion of the Noctuidæ a term of three weeks.

As might be expected in so heterogeneous a family as the Noctuidæ—differing so greatly in general character, coming forth at such different seasons of the year, and varying in the number of the broods,—the life-histories of the several groups vary to the extent of preventing generalization and necessitating specific observations. For example, we find that the genera Xylina, Homoptera and Catocala have their periods of apparition much extended beyond the species above noticed. In the paper by myself, above referred to (p. 51), we find that *Xylina petulca*, *X. disposita* and *X. Bethunei* were observed for a period extending over forty-one, forty-seven and fifty-one days respectively, with a possible prolongation of the lives of some of the later individuals through hibernation and reappearance in the following spring, of six additional months. Seven species of Catocala give an average duration of forty-five days, and from Mr. Devereaux's observations, nine species of Catocala give an average period of fifty-seven days. These last may have shown a prolonged period from their extending over two years—one of which, from a more favorable season, may have included earlier dates of first appearance. It is proper to state that the above species were selected from the lists, as having been observed for the greatest length of time; the larger number gave considerably shorter terms of apparition.

In concluding these brief notes, which are quite unsatisfactory to the writer, and offered only in compliance with request, I would beg leave to suggest that good service may be rendered to Entomology by the collation from published records, and incorporation in our published lists of insects, hereafter, of the several dates of their collection or observation throughout the entire time of their appearance. The want of such data

* *Canadian Entomologist*, vol. xi., pp. 105–109, 1879.

has been felt in the attempt to answer the question of Dr. Wiesmann, as to the duration of life of some of our insects in their perfect state. It would also be of service in the determination of the number of annual broods; it would afford a knowledge of the time for guarding against the initiative of insect attack; it would enable us in many cases to decide upon the best time for putting in our crops; it would enable collectors to seek for specimens for their cabinets when they are to be found; in short, it would furnish an essential part of the life-histories of our species. I commend it to the attention of Entomologists.

ON THE APHIDIDÆ OF FLORIDA, WITH DESCRIPTIONS OF NEW SPECIES.

(Paper No. 2.)

BY WM. H. ASHMEAD, JACKSONVILLE, FLORIDA.

Family Psyllidæ (Jumping Plant-lice).

The species belonging to this interesting family have received very little attention from Entomologists generally, and considering the extent of the North American fauna, comparatively few species have been described. Of these almost nothing is known of their habits and development.

In Europe, with the exception of two or three species, as little is known of their life histories as in America. Kollar, in his Treatise on Insects Injurious to Gardens, &c., according to Westwood, *vide* Introduction, vol. 2, p. 437, gives the history of two species. As I do not possess this work, I am unable to state which these are or how much of their history is known.

According to this author, and probably one of those referred to by Westwood, the Pear Tree Psylla, *Psylla pyri* Linn., "comes forth from its winter retreat provided with wings, as soon as the buds of the fruit trees begin to expand. After pairing, the female lays her eggs in great numbers near each other on the young leaves and blossoms, or on the newly formed shoots. The eggs are oblong, yellowish, and look somewhat like grains of pollen. The young insects, soon after they are hatched,

resemble young wingless plant-lice and are of a dark yellow color. They change their skins and color repeatedly and acquire wing-scales or rudimentary wings, then fix themselves to the bark in rows and remain sucking the sap until about to undergo their last change, when they disperse among the leaves and appear in their winged form."

This account has been copied by nearly every economic Entomologist who has had occasion to treat of these little pests. Even Dr. Harris, in his well known Treatise, nor a later writer, Prof. Thomas, give no new facts.

From my studies of some undescribed species in Florida, and other known facts respecting this family, I feel justified in stating that Kollar's account cannot possibly be correct; especially is this true with regard to its coming forth from its winter retreat provided with wings and in his description of the egg. It does not agree with my observations, nor with those of Leon Defour. To this celebrated Frenchman and indefatigable biologist are we indebted for the first accurate description of a Psylla's egg. Those interested will find an account in his "Recherches anatomiques et physiologiques sur Les Hemipteres," p. 358, and on plate xvii., fig. 191 b. c., good figures of the egg. A translated account may also be found in "Thomas' 8th Illinois Report," p. 16.

In the summer of 1879 I noticed for the first time that the leaves of the young Persimmon trees *(Diospyros virginiana)* in the vicinity of Jacksonville were very much discolored, curled and distorted; on most of them, too, were numerous small warty-like galls. A thorough examination under the curled and twisted parts of the leaves revealed numerous small, flattened, hemipterous bugs, arranged in rows, and covered with a fine mealy or powdery substance; on disturbing they secrete large watery globules, the color of milky water.

A careful study of these during the past two years has enabled me to completely work up their life history, as well as the partial histories of other species which I shall now proceed to give, after giving a list of the known N. A. species.

Genus Diraphia, Waga.

1. D. vernalis, Fitch.
2. D. femoralis, Fitch.
3. D. calamorum, Fitch.
4. D. maculipennis, Fitch.

Genus Psylla.

1. P. pyri, Linn.
2. P. rubi, W. & R.
3. P. tripunctata, Fitch.
4. P. quadrilineata, Fitch.
5. P. carpini, Fitch.
6. P. annulata, Fitch.
7. P. urticæcolens, Fitch.
8. P. quadrisignata ? Walker.
9. P. venusta, O. S.

To these I now add

THE PERSIMMON PSYLLA.

By the middle of April this is found in considerable numbers on the leaves of the young trees, with beaks inserted, almost standing on their heads, and swaying from side to side like the motion of a vessel in a stormy sea. This motion is evidently intended to assist either in inserting the beak or in pumping up the juices of the tree.

At this time they are also caught copulating, soon after which the female begins depositing her eggs. These are very minute, 0.01 inch in length, elongate ovate, pale greenish in color, with a wavy beak beneath at thick end, and a long filament at tip of smaller end, nearly the length of the egg, and extending backwards over it. These are laid along the margin of the leaf, without regard to regularity, the female first preparing for their reception by secreting a thread-like, transparent, gummy substance along the extreme edge of the leaf; she then fastens them in place by the beak, which adheres securely to the gummy substance.

ITS LIFE HISTORY.

These hatch in from 5 to 6 days (actual observation) and the leaf from their punctures curls completely over them; under this they reside until just before the final transformation. The pupa then comes forth, attaches itself to a leaf or twig, and changes into the perfect fly, escaping through a longitudinal slit in the head and thorax. The young take from four to five weeks to mature and breed throughout the whole summer.

Like the Fig Psylla, the fall brood probably lay their eggs in crevices of the bark and twigs; these hatch at the first breath of spring, feed on the tender new shoots and leaves, and are those found fully matured by the first and second week in April.

10. Psylla diospyri, n. sp.

Egg.—Length hardly .01 inch. Elongate ovate, with a long filament at apex of smaller end extending backwards to near its whole length; a

short wavy beak or filament beneath at thick end, which is used for attaching the egg to the leaf.

YOUNG LARVA.—Length about .02 inch. Flattened, elliptical, pale yellowish, pulverulent; head broad, strongly arcuate in front; antennæ short, conical; eyes reddish, large and prominent, situated well back close to thoracic margin; thorax laterally twice dilated back of middle; legs pale; margins fringed with rather long hairs.

PUPA.—Length .10 to .12 inch. Broadly flattened; yellow, greenish beneath; head not so strongly arcuate as in young larva and slightly notched in front; antennæ much longer, apparently 7-jointed, dusky at base; wing-cases very broad and projecting slightly in front of eye and considerably laterally; eyes brownish; abdomen well rounded posteriorly, 8-jointed; legs stout, pale; strongly fringed with long hairs on all sides.

IMAGO.—♂ and ♀ .10 to .12 inch; length of wings .15 inch. Black, shining and slightly pubescent, in certain lights slightly tinged with bronze. Head transverse with a deep frontal notch; eyes prominent, three ocelli black; antennæ filiform, 10-jointed, two basal joints short and stout, dusky, following joints slender, pale yellowish, slightly pubescent, terminal joint thickened, black and tipped with two short bristles; abdomen elongate, somewhat conical, black and shining; metasternum yellowish, epimeral spines long, pale yellowish; wings hyaline, apex of front pair lanceolate, veins yellowish; legs honey yellow, tibiæ shaded with brown, femora dark brown.

The male is easily distinguished by its smaller size and by the usual abdominal differences; otherwise it does not differ from the female.

The sketch on next page, fig. 12, will give one a fair representation of its various stages: *a*, egg; *b*, young larva; *c*, mature larva or pupa; *d*, imago.

THE BAY MAGNOLIA PSYLLA.

This handsome and well known tree, *Magnolia glauca*, is quite common along our creeks and swamps, and is noted far and wide for its beautiful fragrant flowers. It is often, however, greatly disfigured by the sting of a Psylla, producing a large gall on the leaves, a fact I ascertained by breeding. This species is evidently a true gall-maker. The galls are quite conspicuous on the leaves, of a large size, greenish yellow in color with a bluish plume, and when fully matured open along the side in the form of a large curved lip.

ITS LIFE HISTORY.

The eggs I have been unable to find ; it is probably possible that these are laid under the epidermis of the leaf, which may account for my inability to find any, even after a very careful examination of the leaves with my pocket lens. In the interior of the galls, which measure half an inch or more in length, I found the lice in various stages of

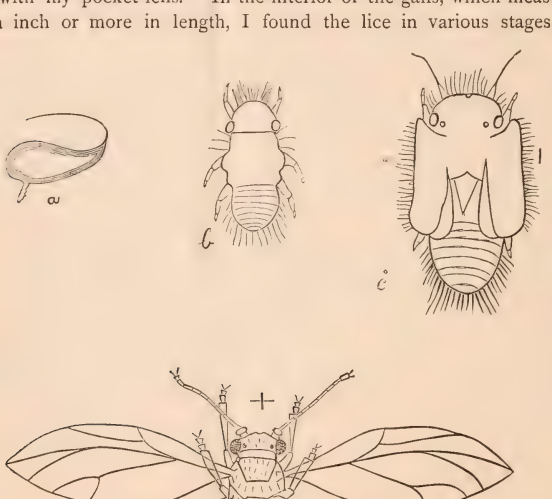

Fig. 12.

growth, generally in the midst of a watery secretion the color of milky water, which almost always fills the galls. Below I give description of different stages :

PSYLLA MAGNOLIÆ, n. sp.

YOUNG LARVA.—Length hardly .02 inch. Elongate, oval, flattened and pale yellowish in color. Head smaller and less rounded before than in previous species ; eyes situated well forward ; antennæ short, conical ;

abdomen more elongate, the sides of thorax not dilated and without the fringing of hairs, as in previous species.

PUPA.—Length .12 to .14 inch. Elongate, oval. Pale greenish yellow. Eyes brownish, prominent and situated further forward than in previous species; wing cases not so broad, obtusely rounded before and not projecting forward towards eyes; abdomen more elongate and notched posteriorly; legs pale; and is easily recognized by not being pubescent

IMAGO.—♂ and ♀. Length .12 inch; wing .14. Pale greenish yellow. Head transverse, not projecting much in front, and with a frontal notch, but not deep; three remote yellow ocelli, situated on yellow ground, two close to but back of eyes, and one in front between antennæ; eyes large and prominent; antennæ 10-jointed, filiform, reaching beyond tip of thorax, two basal joints short and stout, pale to tip of 6th, following joints black; collare transverse, very short, præscutum broadly obcordate; mesothorax has two large deep lateral depressions, extending backwards towards scutellum, with a slight central groove; scutellum triangular; abdomen elongate, pointed; wings hyaline, lanceolate, veins pale greenish; legs, epimeral spines and metasternum pale greenish yellow; basal tarsal joint broadly flattened. The usual structural differences distinguish the male.

THE ILEX PSYLLA.

During a recent short trip to the sea shore, my attention was called (by my friend, Mr. Curtiss) to a gall on *Ilex cassine*, a shrubby tree growing in the rich hammocks along our coasts. These were found on the terminal new leaves, measured from .2 to .3 of an inch in length, and frequently destroyed the whole shape of the leaf. Cutting these open, I found they were caused by a Psylla, and judging from the size of the pupa, is probably the smallest species known. In the galls the young were covered with a mealy powder, very much resembling certain Coccides, and when disturbed do not appear to secrete the watery globules noticed in the previously described species. Below I give description of the stages as far as ascertained:

12. PSYLLA ILECIS, n. sp.

YOUNG LARVA.—Length less than .01 inch, oval, flattened, yellow and pulverulent, with reddish eyes and pale legs.

PUPA.—Length scarcely .03 inch. Yellow, pulverulent; legs and antennæ pale, wing cases well developed and obliquely projecting on either side; abdomen rounded.

DESCRIPTION OF THE PREPARATORY STAGES OF LIBYTHEA BACHMANNI, Kirtland.

BY W. H. EDWARDS, COALBURGH, W. VA.

EGG—In shape are oblate spheroid, somewhat pointed at base, and a little truncated and depressed at summit; marked by many horizontal striæ, and longitudinally by 18 or 20 narrow, prominent ribs, which proceed from base and terminate, some of them irregularly, at about four fifths the distance to summit, while eight, increasing gradually in prominence, end abruptly at the rim of the summit; these long ribs are cut on either side by grooves perpendicular to the surface of the egg; they are also frequently deflected somewhat from a direct line; color pale green. Duration of this stage about 4 days.

YOUNG LARVA—Length just from egg .04 inch; cylindrical; the segments a little rounded, and four times creased transversely; covered with a fine short down; color green, semi-translucent; head twice as broad as 2; obovoid, a little depressed at suture, the vertices rounded; sparsely pilose; color yellow-brown. To 1st moult about 2 days, in July.

After First Moult—Length .08 and .09 inch; color brownish-green, the segments curved; head a little broader than 2, shape as before; color yellow-green. To next moult 2 days.

After Second Moult—Length .12 inch; same shape; upper side dark green; a faint shade of yellow over and along basal ridge, rather macular; under side, legs and feet lighter green; the segments much specked with faint white on the ridges caused by the creases; on 3, high up, a black dot on either side; head as before; color light green. To next moult 2 days.

After Third Moult—Length .26 to .28 inch; color dull green, yellowish along and over basal ridge; specked with pale white, or yellow white, as before; the black dots as before; head green. To next moult about 2 days.

After Fourth Moult—Length .4 inch. Four days later the larva reached maturity.

MATURE LARVA—.7 to .9 inch; cylindrical, thickened at 3 and 4, the dorsum of last segment abruptly curved down to the end; color dark green, the lower side, and also feet and legs, pale green; each segment four times creased transversely and on the flat ridges so caused are

rows, one to each, of small tubercular flattened points, pale or whitish-yellow; from 2 to 13 a white stripe along base, just over the spiracles, and above this the ground is yellowish for a little way; a medio-dorsal yellow line and sometimes a fine line on middle of side; yellow tuberculated points over the legs, in arcs of from 3 to 6; on foremost ridge of 3rd segment, high on the side, a dead black tubercle, a little raised and rounded, in yellow ring; spiracles in brown ovals; surface covered with a fine short down; head obovoid, green, smooth, sparsely pilose; the ocelli brown.

Occasionally the larvæ in later stages are differently colored. One had the dorsum dark green, edged on either side by a gray line, and successively by a band of yellow, a gray line, and a black band; the 3rd segment was wholly, and 5th partly black. Two others of same brood were green, with a black band along base of body, and black patches on 3 and 11.

CHRYSALIS.—Length .5 inch; helmet-shaped; compressed laterally, the abdomen somewhat carinated; mesonotum high, rounded, sloping abruptly to top of head case, much compressed and sharply carinated, followed by a deep excavation; head case not prominent, square or nearly so at top, a little excavated, the corners sub-pyramidal and scarcely at all produced; along carina of abdomen a yellow line, which forks and passes round mesonotum to top of head case; a slight yellow lateral line on abdomen; color green, either deep, or with a blue or a yellow tint; the abdomen much sprinkled with pale yellow flat points or small spots; a few of these about the head case. Duration of this stage 5 days in July, 7 days in August.

I described and figured *Bachmanni* in both sexes, and also the egg, the two later stages of the larva, and the chrysalis, in Butterflies of N. A., Vol. 2, Part 1, 1874. At that time I was unable to give the complete larval history. In subsequent years I have repeatedly taken the butterfly and observed all of the preparatory stages. It is certain that in this region this species appears in several successive generations, probably four, that the later butterflies hibernate, and the survivors are on the wing early in May, and probably in favorable seasons in April. The first generation in descent from the hibernating females are on the wing in June; the second generation in July; the third in August; and late butterflies emerge from chrysalis in September, and these would be of the fourth generation in descent from the hibernating females. The period from laying of the egg

to emergence of the butterfly is from 15 to 17 days. The only food plant known to me is the Hackberry, Celtis occidentalis, and the eggs seem to be nearly always laid on the tender terminal leaves of the branches. By frequent cutting in some trees in my garden I have made them close headed and low, and I never look over them at the proper seasons that I do not find eggs or larvæ of *Bachmanni*. Usually one egg is laid at the end of a branch, in one of the forks, on the leaf stem, but I have seen two eggs on same stem, and occasionally an egg laid on the under side and middle of a leaf. The young larvæ on hatching ascend to the extremity of one of the leaves and remain there, stripping the sides, leaving the midrib untouched, whence it is easy to find them. They eat their way out of the egg a little below the tip, but do not eat the egg shell after emerging, and the empty shell has often guided me to the whereabouts of the young caterpillar. In all stages these larvæ when at rest arch the anterior segments, in the attitude of a Sphinx. When ready to transform they spin buttons of red silk upon the under side of a leaf—chrysalid shells being occasionally discovered in such positions—suspend after the manner of the Nymphalidæ, and in about eight hours pupate. I have noticed no variation in the colors of the larvæ in any brood but the last one of the year.

Fig. 13.

As *Bachmanni* (fig. 13) has been taken in Ontario, it would be well worth while if some lepidopterist there would seek for its eggs or larvæ on Celtis occidentalis, and determine the number of annual generations.

I subjoin notes from my journals of times of appearance and finding of eggs and larvæ :

1873. Between 25th April and 15th May, a worn female taken during my absence from home ; this was evidently a hibernator.

1st Brood.

1873. 11th June, fresh females flying, set one for eggs.
1880. 13th June, found 8 larvae in younger stages.
1881. 25th June till 9th July, found eggs and larvae daily ; first butterfly emerged 19th July.

2nd Brood.

1874. 4th July, caught female while ovipositing; the larvae from these eggs were in chrysalis 17th July.
1876. 9th July, caught female while ovipositing.
1879. 10th and 11th July, found several eggs and young larvae.
1873. 11th July, set female for eggs; found eggs 14th and 23rd July.
1881. 1st to 8th July, found eggs and young larvæ daily.

3rd Brood.

1872. 1st August, saw female ovipositing and found a dozen eggs; 21st August, imagos from these eggs.
1873. 10th August, female ovipositing; up to 25th August continued to find eggs; on 22nd August set female for eggs.
1881. 23rd to 26th August, found eggs and larvæ.

4th Brood.

1875. 7th September, found a fresh egg, a half grown and a mature larva. 14th September, larvae in last stages.
1881. 2nd September, butterflies emerged.
" 11th " " "

NEW MOTHS, CHIEFLY FROM ARIZONA.

BY A. R. GROTE.

HADENA PERPENOA, n. s.

♂. Eyes naked; tibiæ unarmed; abdomen tufted; size moderate. Apparently allied to *Indirecta* and *Cinefacta*, but darker colored, with a certain resemblance to *Mamestra Atlantica* or *Vicina*. Concolorous dark wood brown; lines faint. The usual markings. A dash connects the claviform with the t. p. line. Stronger costal double marks inaugurate the indistinct median lines; the t. a. oblique and approaching the t. p. line near internal margin, where it seems to have a strong tooth running backward on the margin. Stigmata subequal, concolorous. S. t. line indicated, twice indented with darker shades. Fringes dark, narrowly cut with pale. Hind wings fuscous, paler at base, with mesial line and discal shade mark; beneath paler, with discal dot and faintly double extra

mesial line. Thorax concolorous, collar and tegulæ marked with deep brown. *Expanse* 32 mil. One fresh specimen from Arizona.

MAMESTRA BISULCA, n. s.

♂ ♀. Eyes sparsely haired, tibiæ unarmed. Antennæ of the male bipectinate. Colors of *confusa*. Brown, shaded with deep brown and white. A deep brown streak from base to t. p. line along submedian interspace. Cell dark brown. Orbicular concolorous, small; reniform small, more or less white shaded. Median lines near together, feebly indicated by white shades. A deep brown shade on terminal space interrupting s. t. line opposite the cell; this dark shading intrudes again at internal angle, resolving itself into stripes bordering the veins. Pale dots at base of fringe. Hind wings fuscous with pale fringes. Beneath fuscous, dark, sub-irrorate, hind wings pale inferiorly. No lines; discal dots. Head and thorax brown; tegulae with dark edges. Collar pale tipped. *Expanse* 36 mil. Three specimens; Arizona. This may not remain in *Mamestra*, owing to the pectinated antennae. From Mr. Neumoegen's collections.

MAMESTRA TRIFOLII, var. *Oregonica*.

Under this name I register Oregon specimens which appear to belong to *Trifolii*, but differ by the concolorous fore wings, wanting the dark dashes to the subterminal line which has no M-mark, or but a faint one. The hind wings have a faintly yellowish tone. The claviform is reduced and rounded. The dark reniform entirely contrasts. Otherwise I see no differences and we have to do probably with a geographical variety. Kansas specimens are somewhat intermediary. Five specimens of the variety are before me.

SCHINIA BUXEA, n. s.

This species has the front flat, eyes naked, palpi ascending, third article distinct, squamation smooth appressed, scales of thorax flattened and broader. Pale yellow, deepening exteriorly to the brown contrasting fringes. Three fine brown lines angulated superiorly cross the outer half of primaries. Hind wings silky, whitish at base, shading to yellowish exteriorly with pale fringes. Body whitish yellow. *Expanse* 29 mil. *Habitat*, South-western Texas.

By its color and contrasting fringes and fine, nearly equidistant, thread-

like, dark lines on fore wings easily separated from the other described forms.

ONCOCNEMIS GRACILLINEA, n. s.

♂. Size extremely small. Eyes naked. Tibiae with a large claw on anterior pair, at the inner extremity of the joint, and an outer spinule. Aspect, style of marking and color of *Cibalis*. Bright gray ; apices produced. A fine longitudinal black hair streak below median vein. Indications of transverse lines on costa by trembled blackish shades. Subterminal line white, irregular, preceded by a black diffuse shade from apices, the most noticeable character of the wing, partly broken into cuneiform marks toward the middle. A fine, even, continuous, black terminal line. Fringes gray, darker tipped. Hind wings whitish, subpellucid, silky, a fine terminal line and traces of a mesial line. Fringes whitish. Head and thorax gray. *Expanse* 19 mil. Arizona, Mr. Neumoegen. This neatly marked, diminutive species is the twentieth described *Oncocnemis* from North America (see this volume, p. 34). The ground color of the fore wings is almost white, with fine black streakings ; and the subterminal shade very prominent, as in *Cibalis*. The scales on the body are partly flattened and wide. The front is full. The species may be catalogued next to *Cibalis*, in my arrangement, among the gray forms.

The genus is numerous in species in our territory. We have a representative of the European *Confusa*, in *Behrensii*, from California. The nearest species to this are *Levis*, *Glennyi* and *Homogena* from Colorado, and *Augustus* from Texas. The only Eastern form is gray, like *Chandleri* from Colorado. It is the *Riparia* of Mr. Morrison, and has been taken on the coast of the Atlantic by Mr. Tepper, and by myself on the shores of Lake Erie. Its describer considered it as a variety of *Chandleri;* but I am more inclined all the time to regard it as a good species, and thus to contradict my own original idea of it, based, however, on a single specimen. I have myself now taken two, and have now seen others, and I believe the characters I have elsewhere pointed out will always distinguish it from *Chandleri*. The gray species are, then, *Chandleri*, *Riparia*, *Major*, *Aqualis*, *Cibalis* and *Gracillinea*. Another interesting group of species is that to which *Saundersiana*, from Canada and Illinois, belongs. This species is the only one, beside *Riparia*, found east of the Mississippi River. Its near ally is *Occata*, from Texas. The yellow-winged species

from the West are becoming well known through recent collections. They are very interesting and look a little like Anartas. As yet we have three, *Dayi*, *Hayesi* and *Mirificalis;* I believe there are no European species like them. The Californian *Aterrima*, with black secondaries, is a rather small, pretty, but aberrant species, looking something like a *Tarache* at first sight.

It is interesting to note that *Fruva obsoleta*, from Illinois and Texas, is found in Arizona, from whence, also, Mr. Neumoegen has received a specimen of *Heterocampa Belfragei*. It is then likely that a number of species which as yet we only know from Texas, will be found in Arizona.

FRUVA GEORGICA, n. s.

Front with a clypeal protuberance. A little larger than *Fasciatella*, of the same olivaceous buff, dull colored. No lines. Fringes discolorous, blackish. The wing becomes stained with ochreous terminally and a dark shade extends inwardly opposite the cell from the margin. Hind wings fuscous; fringes pale. Beneath pale fuscous, costa of fore wings pale yellowish; fringes dark. The hind wings and fringes on both wings are somewhat silky.

CATOCALA ARIZONÆ Grote, Can. Ent., 163, 1873.

This species has been collected in numbers by Mr. Doll and Mr. Neumoegen has kindly presented me with an example. It is totally distinct from *Walshii*, with which I have already compared it. There is the faint glaucous shade on fore wings described by me. The primaries are more brown than in *Walshii*. I have already published my opinion that Mr. Strecker has very briefly and unrecognizably described this species under the name of *Aspasia*. *Walshii* is not found in Arizona. Both myself and Mr. Strecker compare the species with *Amatrix*. The student is referred to the descriptions published of these species.

PERISPASTA IMMIXTALIS, n. s.

This species is similarly sized with *Caeculalis*, of the same shining fuscous, quite pale beneath, but without the pellucid impressions on primaries. There can be made out the traces of a pre-apical costal curved line enclosing a slightly paler space. The wings are shaped as in its ally. New York, collected by Mr. Angus and given me by Prof Fernald.

For some time I was inclined to consider this the ♀ of *Caeculalis*, but I make out the frenulum of my type to be single and the specimen therefore a male. The species are small and frail in this Pyralid genus and may be known by the peculiarly shaped wings.

Botis Commortalis, n. s.

A small form no larger than *Vibicalis*, very distinctly marked and easily recognized. Fore wings brown, crossed by two mesial distinct nearly upright lines. Fringes white. Head and thorax dark. Hind wings pure white, immaculate. Beneath fore wings dark, hind wings white; legs whitish. *Expanse* 11 mil. Havilah, Calif., Mr. Edwards.

This little species must be easily recognized. It is possible that it may be placed more advantageously in an allied genus when the neuration can be studied.

(To be Continued.)

ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The Annual Meeting of the Society was held, according to announcement, in their rooms, Victoria Hall, London, Ont., on Monday evening, Sept. 26, 1881.

A number of those interested in Entomology were present from different parts of the Province, the President, Mr. Wm. Saunders, in the chair. The report of the Council was read and adopted, and the Sec.-Treasurer submitted his financial report, which was duly adopted.

Letters of apology for non-attendance were read from Rev. C. J. S. Bethune, Jas Fletcher, W. H. Harrington, W. Couper and G. J. Bowles.

The President then delivered his annual address, on the conclusion of which the meeting unanimously tendered Mr. Saunders a vote of thanks, with a request that his address be printed in the Canadian Entomologist.

The election of officers then took place, when the following gentlemen were declared duly elected:

President—Wm. Saunders, London.

Vice-President—G. J. Bowles, Montreal.

Secretary-Treasurer and Librarian—E. Baynes Reed, London.

Council—Rev. C. J. S. Bethune, Port Hope; J. A. Moffat, Hamilton; James Fletcher, Ottawa; R. V. Rogers, Kingston; J. M. Denton, London; W. H. Harrington, Ottawa, and W. Couper, Montreal.

Editor—Wm. Saunders.

Editing Committee—Rev. C. J. S. Bethune, J. M. Denton, E. Baynes Reed.

Auditors—Chas. Chapman, H. Bock.

The report of the Montreal Branch was next read.

Routine business having been transacted, the chairman invited discussion on any Entomological matters.

POTATO BEETLE.

Prof. J. T. Bell, of Belleville, remarked that he had found the Potato Beetle feeding in his neighborhood on the "Bittersweet," *Solanum dulcamara*. Mr. Saunders stated that during a recent visit to Colorado, although he travelled much over the plains and through the mountain canons, he found no traces of this insect in any of its stages.

Mr. Chas. Arnold, of Paris, said that in his section the Colorado Beetle after having devoured the potato vines, attacked the tomato plants.

Mr. P. C. Dempsey, of Trenton, stated that he had preserved his tomato vines from injury by the beetle by the free use of Paris Green on his potato plants.

Mr. J. A. Moffat, of Hamilton, stated that he had observed serious injury to be caused to the young plants by the beetle.

Mr. Saunders reported that *Lebia grandis*, one of the beneficial insects which devour the larvæ of the Colorado Beetle, had been found by him in greater numbers than usual, and that he had taken a number of specimens at night when sugaring for moths. Mr. Moffat had also observed it to be common near Hamilton on the Golden-rod, *Solidago*.

COTTON WORM.

Mr. Jas. Fletcher had written to ask if any member had made any observations during the year on the moth of the Cotton Worm, *Aletia argillacea*, in reference to which an interesting discussion took place at the last annual meeting.

Mr. Moffat reported having captured several specimens, and Mr. Reed had observed their frequent occurrence attracted by light in the house at night during September.

CABBAGE BUTTERFLY.

Mr. Saunders reported that as far as he could ascertain, the extreme western limit of this insect did not at present exceed 100 miles west of Chicago. Prof. Bell stated that he was of opinion that in the neighborhood of Belleville the common English Sparrow had proved useful in destroying the larvæ of this butterfly.

The chairman, Mr. Saunders, remarked that this was contrary to the experience of all those who had made a special study of the habits of this sparrow, and enquired whether the Professor had ever examined the crop of the bird for evidences of the presence of this larva, to which the Professor replied in the negative.

A RARE BEETLE.

Prof. Bell exhibited several specimens of *Alaus gorgops*, one of which he had captured near Belleville; and showed the peculiar points of difference between this insect and our common Eyed Elater, *Alaus oculatus*.

NEW CLOVER INSECT.

Mr. Wm. Weld, editor of the *Farmer's Advocate*, said that he had lately read in several American papers accounts of the ravages of a new clover insect, that specimens of clover heads had recently been sent him by several correspondents, infested with an insect which he believed to be this new species, and asked whether any of the Entomologists present could give him any information as to where it had occurred and the amount of damage it was likely to cause in this Province.

Mr. Arnold thought from what he had heard from those growing clover in his vicinity that this insect was injuring the crop there. Mr. Saunders said that the insect had not yet come under his observation and that he would be very glad to receive specimens from any person who should find them in this Province.

The insect referred to is the Clover Midge, *Cecidomyia leguminicola*, a small fly which in its larval state devours the ripening seeds in the clover heads.

PEA BUGS.

Mr. Weld also enquired as to the experience of those present as to the ravages of this pest during the year.

Mr. Arnold said that the Pea Bug had committed more damage this year in his neighborhood than ever before. Some friend had recommended him to enclose a piece of camphor in the bags of seed peas with a view of destroying the insect; this he had tried and found useless. Mr. Gott, of Arkona, had not found the beetles so plentiful this year as usual. The subject was discussed at some length, and the general opinion expressed that the most feasible remedy was to cease growing peas for a time in any district where the insect had proved seriously destructive, and thus starve them out.

THE MAPLE TREE BORER.

Prof. Bell remarked that he had found this borer. "*Clytus speciosus*," not nearly so common as formerly. Mr. Saunders said that he believed it to be increasing in the neighborhood of London, and that some of the street trees had been seriously injured by it; he also referred to the depredations of another maple borer, "*Ageria acerni*," a small moth whose larva burrows under the bark of the red maple, "*Acer rubrum*," and in season was quite common on the trunks of the maple trees on our streets. Mr. Reed also reported the maples round his house being much infested by this pest, the empty cocoons being found protruding from the trunks of the trees in quantities during the summer.

A discussion then ensued on the probabilities of new insect pests being introduced from abroad by the importation of grains, seeds and trees, in which several of the members took part. Mr. Weld urged that the Society should call the attention of the Government to the necessity of taking every possible precaution to prevent the introduction of such insects. The President remarked that in his official capacity he had through the Provincial Agricultural Association already brought this matter before the Government, and that some steps in this direction had been taken.

The meeting then assumed an informal character and the members were shown by Messrs. Saunders, Denton and Reed many of the more interesting specimens in the Society's large collections, and also exhibited microscopic specimens illustrating the structure of insects; the valuable library of the Society was also examined by the members and added to the interest of the gathering.

After enjoying a very pleasant and profitable evening the meeting adjourned.

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IS LIMENITIS ARTHEMIS A DOUBLE-BROODED SPECIES?

BY W. H. EDWARDS, COALBURGH, W. VA.

In Butterflies of N. A., Vol. 2, Part 8, 1879, I gave the history of *Arthemis*, and stated that it was single-brooded: that the first butterflies of the season appear in the Catskills about the end of June; that they are abundant during July; that the eggs are laid last of July and early in August; that the larvæ from these eggs pass two moults and then go into lethargy in cases of their own construction; that they come from these cases in spring and moult twice before chrysalis. I related my own experience in breeding, and I particularly say that the existence of the species is due to the eggs laid in July and early in August, because eggs laid later than this, *although by females of the same generation of the butterflies*, cannot give larvæ which shall be able to reach the hibernating stage before cold weather sets in.

Mr. Scudder, in a paper read before the Appalachian Club, at Jackson, N. H., July 12th, 1881, and printed in The Mountain Echo, 30th July, upon *Arthemis*, under the name of Basilarchia *Arthemis*, gives a very different account of the species, and declares it to be two-brooded. "Twice a year it runs the cycle of its changes . . . . As a general rule its first appearance here (in W. Mts.) is between the 16th and 20th of June, and its second late in August. . . . . About the middle of August the caterpillars now feeding will be rapidly changing to chrysalis, and in 10 or 12 days afterwards the butterfly will again be on the wing and the cycle recommences."

Mr. Scudder goes on to say: "The history I have now given does not agree with Edwards' account of the insect. He would make it out single-brooded, *having never seen or heard apparently of the September butterflies*"; adding these words in explanation of my error: "and so it probably is (i. e., single-brooded) in the southern part of its range, for all the butterflies taken south of this region of their abundance have been of the first brood; that they have not flown thither from these northern parts is proved

by their usually greater size." It is admitted then that the species is probably single-brooded in the southern part of its range, i. e., in the Catskills. It strikes me as very singular that *Arthemis* should be single-brooded to the southward, but double to the northward—and not so very far north, either, the Catskills being from 1° to 2° only south of the White Mts.,—exactly the reverse of what happens with every other species of butterfly.

On reading the paper spoken of, I wrote the author thus: "Do you know of any one who has raised a caterpillar of *Arthemis* from egg to chrysalis and imago the same season? Did you ever do it yourself?" To this the reply came: "I have bred *Arthemis* only from the wintering caterpillars, and I know of no one who has bred them from the egg in N. Hampshire, *but you cannot get away from a fresh September brood*, which I have on the authority of three or four persons, indeed myself."

Let us look into this matter of "a fresh September brood." I will first relate briefly the experience of Mr. Mead and myself with *Arthemis* and its co-form *Proserpina*, and so far as I know, we, with Mr. C. H. Roberts, formerly of Factory Point, Vt., are the only persons who are recorded to have bred *Arthemis* from the egg. In Can. Ent., vii., p. 162, Mr. Mead states, that in July, 1875, he had 15 females of *Arthemis* and one female of *Proserpina* confined in boxes with growing branches of willow, at Hunter, N. Y., in the Catskills. That the *Arthemis* laid about 500 eggs and the *Proserpina* 35. I myself came to Hunter just at this time, arriving 25th July, and Mr. Mead gave me many larvæ from these eggs, and I brought them to Coalburgh while they were in their 2nd and 3rd stages, i. e., after 1st and 2nd moults, reaching home 17th August. These larvæ all went into cases, the last one on 20th August, not one going on to chrysalis. On 25th Aug., I received from Mr. Mead, who was still at Hunter, more larvæ in first stage, i. e., just out of egg, and these were making their cases 9th Sept., or three weeks later than the first lot. That represents the difference, or part of it, between the time of the emerging from chrysalis of the earlier and later butterflies of the same generation. There is a similar difference in the emerging of all species of butterflies, as every lepidopterist knows. All of these larvæ, though from eggs laid by different females, and during three weeks, behaved in the same way, all going into lethargy, and none to chrysalis. Mr. Mead had taken part of the brood to New York City and some to Ithaca, N. Y., and none went to chrysalis.

The next year, 1876, I was at Hunter from 19th Aug. to about 10th Oct. During the early part of this period a few *Arthemis* were on the wing, but they were exceedingly rare, though in July the species abounds. Mr. Mead has stated that in July, 1875, he did take 200 examples and might have taken 1,000. But this great flight was over when I reached the mountains, and only here and there was a single individual to be seen. I was out every day searching for them in order to obtain eggs. All our larvæ of 1875, excepting a small number, had died during the winter, and of these, three or four only reached chrysalis and imago in the spring of 1876, giving the form *Arthemis*. I was therefore anxious to repeat the experiment, with the hope of determining the relation of *Proserpina*, and I travelled far and wide to get females of one or both forms. With this result: on 21st Aug., I took 3 *Arthemis* ♀; on 22nd, 1 *Arthemis* ♀, 1 *Proserpina* ♀; on 24th, 2 *Arthemis* ♂, 1 *Proserpina* ♀; on 26th, 1 *Arthemis* ♀; 1st Sept., 1 *Arthemis* ♀. In all 9 butterflies, 7 ♀, 2 ♂. On 28th, I had ridden several miles among the hills, and found many Arg. *Atlantis* and other species, but I saw, but failed to take, only one *Arthemis*, a ♀, that day. Seven of the nine spoken of were taken in Stoney Clove, the coldest spot in these mountains, and the very one at which cool weather during early summer would retard the emerging of the butterflies.

It is plain that there is no "September brood" of *Arthemis* in the Catskills.

Of these females, all of which were shut up for eggs, one only laid, viz., *Proserpina* of 22nd Aug. I had kept her alive on sugar and apple, and the weather was so cold that during some days and most of the nights, I had to bring her into the house; but 1st Sept., she laid 11 eggs and died. The other females had meantime died, and on dissection were always found to contain a few nearly matured eggs, perhaps the remains of a large original stock. Though observations on other species of butterflies have led me to suspect that the latest females of a generation may develop but a very few eggs, and that these in the absence of males may generally prove sterile.

The larvæ from my *Proserpina* eggs hatched from 10th to 12th Sept., or in from 9 to 11 days. They began to reach 1st moult 18th Sept., and were all past 2nd moult 24th Sept. By 30th Sept., all were in their cases. As I stated in But. N. A., I should not have raised one of these larvæ to case had I not protected them in a warm room, and carefully preserved

food for them. The weather was cold, nights frosty and the leaves of their food plant (Aspen) were fallen to the ground before the cases were reached. I was confident at the time that the larvæ would have perished out of doors, and that the existence of the species wholly depended on the larvæ from eggs laid by the earlier emerging females. And I believe now that the late emerging females are either sterile, or if eggs are laid later than 20th August, the larvæ perish prematurely. In nine years out of ten, the equinoctial storms come on between 15th and 20th Sept., and what the weather is thereafter, all dwellers in the mountains well know. I have seen a foot of snow here in Virginia on 26th Sept.

Now in N. Hampshire, in the White Mts., I have never supposed the climate was milder than in the Catskills. Mr. Scudder makes his second brood of butterflies emerge from chrysalis about 1st Sept. How much time is to be allowed for the eggs to mature, and to be impregnated and laid, is not stated. My own opinion is that this would require not less than 20 days, even in mid-summer. I know it takes all of that in case of the allied species, *Disippus*. But we will say 10 days, lest winter be upon us. This brings us to about 10th September, when the eggs are laid. Ten days more before hatching, and we reach 20th, just in time to enjoy the equinoctial storms. Then if haply any larvæ survive, three weeks, at the very least, must be allowed for growth to the hibernating stage, and we are in October, clear, cold, windy, and very likely a good covering of snow upon the ground! And yet Mr. Scudder says the existence of this species is due to these September caterpillars—poor little belated, benumbed, frozen and perishing creatures!

If *Arthemis* is really double-brooded in the White Mts., with a flight in September, then of course it must be so in some part of Canada. We surely cannot be asked to believe that it could be double only in one locality out of its vast range. Therefore I have written several of the lepidopterists of Quebec and Ontario on this matter, and I give their replies.

1. Mr. H. H. Lyman, of Montreal, whom I requested to present the case to the members of the Natural History Society, and collect their testimony. "I was obliged to delay my answer till after the October meeting of our Society. I have never seen any specimens of *Arthemis* in the neighborhood of Montreal in Aug. or Sept., nor have any of our Montreal entomologists."

2. Rev. Thos. W. Fyles, of Cowansville, P. Q., writes: "*Arthemis*

is so abundant here that I have paid less attention to it than its beauty deserves. It disappears in August, but at what time of the month I cannot say."

3. Mr. J, Alston Moffatt, of Hamilton, Ont., writes: "Here are the dates of my captures of *Arthemis* for a series of years: 1873, 3rd July; 1874, June 29; 1875, June 29; 1876, July 7; 1877, June 23; 1878, June 27; 1881, July 1. They seem to fly 3 or 4 weeks, then gradually disappear. I have seen an odd one the middle of August, which I thought very late. I never saw, or heard of their being seen, in Sept., in this locality. Probably they are out a few days earlier than my first captures, but the last week in June and the first in July is when we expect them, according as the season has been late or early. I never saw or heard anything to cause the slightest suspicion of their being double-brooded."

4. Mr. Wm. Saunders, of London, Ont., writes: "With regard to *Arthemis*, it occurs with us late in June and during July, and I think early in August. I am satisfied that I have never seen one on the wing here as late as Sept., and do not think I have ever taken one after the first week in August."

I hardly think it necessary to call more witnesses from Canada.

Nor is the testimony from the Adirondacks, of New York, favorable to the existence of a second brood of *Arthemis*. Mr. W. W. Hill, of Albany, who has collected for many seasons in these mountains, which correspond in latitude to the W. Mts., says that while the species is excessively abundant in July, he has not met with it in September. In New Hampshire, Mr. C. P. Whitney, at Milford, writes: "*Arthemis* is rare in this vicinity. All told, I have not seen 25 examples, and none that I now recollect later than July."

I do not say that it is not possible for here and there a larva of *Arthemis* from eggs laid in July to go on to chrysalis and butterfly the same season. There is no evidence from breeding that they ever do so; on the contrary, all the evidence so far is the other way. I have bred many *L. Disippus*, and through many years. This is a three-brooded species here, and the caterpillars of the last brood make cases at either 2nd or 3rd moult, about two-thirds of them at 2nd. I have never known a caterpillar of any earlier brood stop at any stage and go into its case. But I have reason to know that L. *Ursula* behaves quite differently. I have myself never been able to get eggs of this species. It is common in our forest roads in June, but not common near my residence. After June

there are but few examples anywhere to be seen, but so late as August and September, I have occasionally taken a ♀, never a ♂. In some years two or three, in others none. I have always confined these females for eggs, but have failed to get any. On dissection a few nearly matured eggs would be found imbedded in fat, and I had some time ago concluded that these eggs probably were not impregnated, as I had seen no late males.

But this last September, I received from Mr. Lewis Ullrich, of Tiffin, Ohio, several hibernating cases of *Ursula* and a chrysalis. Mr. Ullrich wrote me that on 26th Aug., he obtained from a female tied in a bag over a branch of apple tree 13 eggs, from which he got 11 larvæ. Of these, 6 went into cases when half grown, 1 died when ¾ grown, and 4 went to chrysalis. Two of the chrysalids produced females, and these Mr. Ullrich sent me. I dissected one of them, and could discover no signs of eggs. Certainly there were no eggs formed. The other female I sent to Mr. C. S. Minot, who has not reported on its condition.

This then accounts for the late examples of *Ursula* seen on the wing. Part of a brood may go into winter cases, while some go on to chrysalis and imago. But the existence of the species does not depend on these late, or September butterflies. Far from it! *Disippus* does not behave like *Ursula* in this respect, as observations show, and there is no evidence that *Arthemis* does. And yet, if any *Arthemis*, in any locality, are to be found flying in September, their presence may be accounted for by supposing that here and there a larva has passed the hibernating stage and gone on to butterfly, without there being a "second brood."

NEW SPECIES OF TINEIDÆ.

BY MARY E. MURTFELDT, KIRKWOOD, ST. LOUIS, MO.

GELECHIA CHAMBERSELLA.—In some notes on the larvæ of certain Tineids, published in Vol. vi., No. 12 of the CANADIAN ENTOMOLOGIST, I referred to an interesting species found on *Ambrosia artemesiæfolia*, which I proposed soon to describe under the above name. The description was indefinitely delayed by a vexatious accident by which I lost all my perfect specimens. For several succeeding years I searched in vain for

the larvæ, and as the moth is not attracted by lamp-light, I began to despair of ever replacing the lost specimens. During the past summer, however, I was successful in taking several of the larvae, from which I obtained three imagines, and am thereby enabled to prepare the history of the insect for publication

(My acknowledgments are here due to Mr. V. T. Chambers for the generic determination of this and the following species, and for much other assistance in my studies of this group of Micros. I am also indebted to Prof. O. S. Westcott, of Chicago, for valuable suggestions as to the selection and etymology of the names)

Imago : Alar expanse 0.35 inch, length 0.20 inch. General color of head and body cream-white, shading to buff on abdomen. Head variegated with fuscous scales ; vertex roughened but scarcely tufted ; palpi slightly exceeding the vertex, second joint brush-like, terminal joint smooth and slender ; antennae rather short, dingy white, obscurely annulated with fuscous.

Ground color of primaries dingy white, thickly overlaid with fuscous scales arranged in eight or nine obscure vittae, most pronounced on apical third, with a more or less distinct fulvous spot on the outer edge of disk ; outer margin dark ; ciliae checkered white and fuscous. Secondaries silky, pale cinereous. Legs cream white, tibiae of hinder pair clothed with long, somewhat iridescent hairs ; tarsi with fuscous annulations.

The larva inhabits a fusiform case formed by webbing together the slender divisions of the leaf, from which it eats the parenchyma of the upper surface, the latter being folded inside. Its average length is 0.35 inch ; slender, cylindrical, sub-moniliform. Head small, polished, dark brown. The arrangement of colors on the body is striking and characteristic. First segment narrow, dark brown with small, transversely oblong, yellowish shield. Second and third and sixth and seventh segments velvety black or very dark brown, with conspicuous milk-white fold on posterior edge. Fourth and fifth segments uniform velvety black. Remaining segments similar with the addition of an oblique lateral white band on each anterior edge. Hairs fine, short and black. The larva makes several cases in the course of growth and changes to pupa within the last, enclosed in slight cocoon. The imago appears in July and early in September.

Gelechia formosella.—This species bears considerable resemblance to *G. maculimarginella* Cham., but is nearly one-half larger, the alar

expanse being from 0.70 to 0.75 inch. The colors are also much deeper, more contrasted and somewhat differently disposed.

Face golden buff, vertex dark silvery, second joint of palpi pale ochreous dusted with brown, terminal joint very acute dark brown, antennae pale purple-brown.

Thorax and primaries dark slate gray with purplish reflections and variegated with small irregular ochreous and dark purple dots. There is a conspicuous purple spot on the costa at the outer edge of the basal third, and obliquely forward and below this a large irregular purple discal spot with minute ochreous dots on its inner margin. The outer one-third is entirely dark brown with purplish reflections brightened by a distinct costal streak of cream white and a similar opposite dorsal streak. Ciliae pale brown. Secondaries cinereous, shading to pale brown on costal edge. Abdomen same color. Legs pale ochreous variegated with brown.

The larva feeds on the Laurel Oak in May, rolling the leaves. It is of a pearl gray color ornamented with eight fine longitudinal purple or dull red lines. Head polished black. First segment narrow and constricted, corneous, black ; second segment velvety chocolate brown edged anteriorly and posteriorly with white, third segment also edged anteriorly with white. Venter and prolegs translucent greenish white. Thoracic legs black. Pupa enclosed in slight cocoon within folded leaf. Imago appears about the middle of June. Rather rare.

Gelechia cinerella.—The general color of this species is ochreous cinereous in all its parts. Head and thorax paler than the wings, inclining to cream color. Palpi simple, not exceeding the vertex. Primaries variegated with a few longitudinal fuscous streaks and a marginal row of minute black dots at the base of the ciliae. Alar expanse 0.45 to 0.50 inch. Length 0.20 inch.

The larva may be found during June and July mining and crumpling the edges of the leaves of the Horse Nettle (*Solanum carolinense*), causing them to turn brown as though seared by fire. Inside the puffy mine the larva forms and inhabits a tough silken gallery to which the frass is attached externally and upon which the edge of the leaf is gathered. The larva is cylindrical, rather thick and about one-third of an inch in length at maturity. It is of a translucent green color, the thoracic segments acquiring a blue tint after the last moult. Piliferous spots glassy, giving rise to short light hairs. Head and shield bright brown. When ready to transform it deserts its mine and forms a tough, oval cocoon on the sur-

face of the earth. Imago appears in from twelve to fifteen days, and there are at least two successive broods.

GELECHIA BENEFICENTELLA.—Ground color of head, body and primaries pale buff or cream with ochreous shadings and a sparse dusting of blackish scales. Palpi exceeding the vertex, second joint thickened but smooth, terminal joint with two broad dusky bands. Primaries ornamented with numerous, rather indefinite maculae, of a blackish or dark steel gray color, producing on the light ground a somewhat checkered appearance. The dark color predominates toward the apex of the wing, and the outer border and ciliae are of the same dark shade. Secondaries broad, silky, cinereous with slight iridescence, ciliae a shade or two paler.

Legs cream color, dusted with blackish scales, tibiae of hinder pair densely tufted. Alar expanse from 0.70 to 0.75 inch.

The first brood of larvae may be found early in May folding the terminal leaves of *Solanum carolinense* into round, hollow balls, each of which forms the habitation of a single larva which feeds on the incipient flower buds and the infolded edges of the tender leaves. Length of larva from 0.50 to 0.60 inch, fusiform, greatest diameter 0.10. Color dull yellowish green with dark-glaucous vesicular stripe. Head horizontal, cordate, about one-half the width of middle segments, black when young, later assuming an olive brown hue. Cervical shield corneous, rectangular, covering about two-thirds of the first segment, of an olive brown color. Piliferous plates minute, pale brown, each giving rise to a short light hair.

Pupa elongate, dark brown, without marked characteristics, suspended in the midst of a mass of fine, webby matter with which the mature larva fills its leafy domicile, an opening being also prepared through which the future moth can make its exit. Imago issues within two weeks. A second brood of larvæ soon follows.

The specific name for this insect was selected with reference to its services in the larva state, in preventing, to a considerable extent, the blossoming and fruiting of one of our most pernicious weeds.

LITHOCOLLETIS GREGARIELLA.—Ground color rich purple-brown with golden reflections. Two conspicuous golden-white fascia cross the basal and discal portions of the primaries. The apical one-third is ornamented with two white costal streaks and one dorsal streak opposite the inner costal one. Ciliæ dingy white. Secondaries very narrow, steel gray. Head purplish, iridescent, antennae dark purple conspicuously tipped with

white. Expanse 0.15 to 0.18 inch. This species is closely allied to *L. desmodiella* Clem., but Mr. Chambers notes the points of difference as follows: "There is a shade of difference in the ground color, face not white as in *desmodiella*, though with a silvery or opalescent lustre; the dark margins of the fasciae and streaks are less distinct; it has no distinct dorsal mark opposite the costal one before the ciliae, and the apical part of the wing is not darker than the remainder; it is also a little larger than *desmodiella*."

The larva belongs to the cylindrical group, is of a whitish green color, and attains a length of about 0.14 inch. It mines the leaves of the Wild Bean *(Phaseolus pauciflorus)*. Its chief peculiarity is found in its gregarious habit, from five to fifteen imagines sometimes emerging from the large tentiform mine. The parent moth places her eggs here and there upon the under surface of the leaf, upon which the work of the young miners is soon apparent in the form of numerous minute blisters, which as they are enlarged, become confluent, and the congregated larvae soon devour every particle of the green tissue of the leaf, which puffs out into a cylinder. When mature the larvae construct in common a loose hammock-like web, within which they change to slender honey-yellow pupae. The imagines of the midsummer brood appear in twelve or fourteen days from the change to pupae. The second brood hibernates in the pupa state.

MR. SCUDDER'S "BUTTERFLIES."

BY S. H. PEABODY, CHAMPAIGN, ILL.

This long promised and lately issued book wants little that the skill of artizan or the genius of artist can furnish. The Entomological brotherhood—those lovers of the net and flask, who, gentler than the historic angler, impale not even a worm until it has become insensible to pain—they and the general public will find some store of delightful reading within its pages. Whether, as has been more than hinted, there are notable omissions of valuable matter observed and reported, and bearing with force upon topics treated therein, or not, there is enough of what Mr. Scudder has himself seen, to make the volume a valuable addition to the literature of Psyche.

The fact that so many intelligent Entomologists have found themselves impelled to put on record their dissent from statements and theories found in this book, may, perhaps, be construed as a recognition of the high place which Mr. Scudder has held and still occupies as a scientific writer. The greater the authority borne by his words, the more earnest must be the protest of those who believe that in certain respects his utterances are misleading and mischievous. Reviewers in the New York Tribune, in the Nation, and elsewhere, have found in this work many points which invite trenchant criticism, in directions where the writer of this article does not care to follow. There remains, however, a topic upon which something should be said. We believe we shall be sustained by many of the foremost lepidopterists, when we express the opinion that this work is grieviously marred by a nomenclature that is singularly unscientific and confusing. If it shall appear that in the reproduction of this nomenclature, Mr. Scudder has acted not inadvertently, but in the face of positive and conclusive facts, which have demolished the foundation and razed the superstructure formerly constructed by him, then the terms by which we have characterized this nomenclature are not as explicit and as severe as they might well be made.

After Mr. Scudder had proposed his wholesale deformation of the nomenclature of American Butterflies, as published in his "Systematic Revision," in the Fourth Annual Report of the Peabody Academy of Sciences, we took occasion to review that Revision in the pages of the *Entomologist*. In that paper we attempted to show that the differences upon which, as criteria, Mr. Scudder had formed his new genera, even if, for argument's sake, these differences were admitted to be real, were not such as authorized the construction of new genera. As an example, applying the test of accurate and just comparison which every scientific discussion demands, we presented a tabulated statement of the characters of several of the proposed genera, collated from the printed diagnoses of these genera, and showing in parallel columns all the distinctions given. By this means we sought to show, as it seemed evident to ourselves, that the differences on which these genera were founded were both in fact and in statement evanescent and delusive, and not such as science could or should recognize as generic in their significance. We had prepared like synoptic tables of others of the proposed genera, and had found the innovations equally open to adverse criticism, but the specimen given seemed sufficient evidence of the quality of the whole. In the west, at

least, grain is bought and sold by sample. Let it not be understood that we refer to this paper, its arguments, or its conclusions, as in any respect binding upon the opinions or expressions of Mr. Scudder. Upon the question of the value of the criteria referred to, there was room for great difference of opinion, and perhaps the points made might have been conclusively answered, even though no answer has been offered in the five years that have since glided into the past.

But the insuperable objection was yet to come, one which appears to be conclusively and finally fatal to the farther recognition of Mr. Scudder's new genera.

This objection was that the criteria on which the new genera had been constructed, the differences described in the ratios of tibiæ, the venation of wings, etc., when tested by careful measurement did not exist, as the constant and distinguishing differences between the genera which they had been said to designate. These measurements were made with great care and in large numbers by Mr. Theodore L. Mead, and were described by him in the columns of this magazine (Can. Ent. vii., 232–238). They showed that on the points specified the range of variation in well identified and indubitable specimens of the same species, was greater than, and included all, the variation that had been given as differentiating the genera. The question was no longer one of argument or of opinion, but of fact. We had argued that the differences, if existing, are not generic; Mr. Mead demonstrated that they did not exist, as constant in genera, but as found in individuals, or in species of the same genus. Facts, however stupid and senseless they may seem to him whose theories they oppose, are yet stubborn. No man who claims to recognize scientific truth can gainsay or deny them.

We claim, then, that Mr. Scudder's persistent use of his nomenclature in the face of these demonstrations is unscientific. Removed from a scientific basis, the system which subdivides genera without stint, which transfers specific names from genus to genus, which disturbs and inverts the familiar sequences of tribes, genera and species, becomes utterly and inextricably confusing. We are thankful that the well known, and well worn, cuts from Harris are again in service to show us bewildered mortals what familiar forms are signified by the unrecognized cognomens. We are also grateful for a catalogue in the appendix, where, as in a court calendar, we may learn what was the maiden name of the lady who has acquired a new title by wedlock or otherwise.

Meanwhile we must express our sympathy for the "*Auctores*" who are so constantly quoted to be as constantly corrected. Poor fellows! They did know Lepidoptera so shockingly.

But Mr. Scudder does not seem to be content even with his own handiwork. Although he has cut a slice from a genus at this end, and a piece from that end, and a fragment out of the middle, and has given new names to pieces and relics alike, and in spite of swapping specific names, until they pass from hand to hand like soiled postal currency, he has yet a mission. He is seized with a certain Adamic afflatus, and begins the work afresh. Seated in his Eden he orders the Psyche phalanx to defile before him, and to each insect as it comes to a salute he presents a new name. Some are fairly suggestive; some on the principle of *Lucus a non lucendo;* some entirely fanciful; some singularly inapt; all unnecessary, and furnishing a still further element of confusion. Upon an erroneous assumption that *Danais Archippus* lives as an imago for a year and a half, it is dubbed the Monarch—certainly a ruler without a subject. If, as Mr. Edwards suggests, its longevity were proven, the insect might be called Patriarch; because of its wide and wandering range, we suggest that it were better with the name of Pilgrim, or possibly of Tramp. As the Monarch governs nobody, and *Limenitis Disippus* resembles him, no matter how, he must be Viceroy. Because the latter is tawny, and congeners are black, they are grouped as Purples. *Papilio Philenor*, which Say described—and Say had an eye for color—as black with green reflections, is called the Blue Swallow-tail. The genus once called Argynnis is broken up into several, but all receive the name Fritillaries. Diana remains Diana. Idalia becomes the Regal Fritillary; Cybele the Great Spangled Fritillary; Aphrodite the Silver-spot Fritillary; Atlantis the Mountain Silver-spot (not Fritillary); and Myrina is the Silver-bordered Fritillary. And so on to the end of the flitting, fluttering train.

Now, in the name of science, we seriously and earnestly protest against all this. Nearly every branch of natural history is cursed with a series of trivial or common names, which having no definiteness nor certainty of application, stand in the way of those which are accurate and significant. Birds, fishes, reptiles, plants have different names in localities not farther removed than adjacent counties, and one is always uncertain as to the species which is indicated. The scheme of Linnean nomenclature was devised to remedy this evil. English Entomologists have suffered their science to bear the burden of a double system of names,

and it has been an occasion of devout thankfulness that no attempt has been made until lately to import the " common " ones within our borders. Their introduction, if successful, will be found a blunder surpassed in atrocity only by the introduction of the English Sparrow.

With grim sarcasm, the Tribune says : " A sufficient reason why these terms [the proposed 'common' names] should be fixed and permanently adopted is found in the fact that the scientific nomenclatnre is so variable, fluctuating constantly as one system of classification supersedes another. The practice of Mr. Scudder illustrates this confusion. Five new genera now take the place of Papilio, while that name has been transferred to a subdivision of what has been called the genus Vanessa. Specific names are shifted with the same freedom. Under the circumstances common names will be found of great value in indicating what particular butterfly is meant, just as scientific names are used in Botany to identify any plant which is spoken of under one or another of its more popular names."

As if, after dear little Buttercup had " mixed those children up," she had proceeded to solve the problem of their misplaced identities by giving them a new set of names. Or, since Mr. Scudder has introduced into the nomenclature of our butterflies a confusion as complete as it is ingenious, he now deserves great credit for leading us out of this maze of his creation by way of a series of new names, freshly devised for the occasion.

BOOK NOTICES.

Papilio :

This valuable monthly serial, devoted entirely to Lepidoptera, has now reached its ninth number, with an average of about 20 pages per number. It is the organ of the New York Entomological Club, is well got up as to printing and paper, and is edited by the Secretary of the Club, Mr. Henry Edwards. A large portion of its space is devoted to descriptive Entomology, with occasional papers relating to the life history of species. In the September number, among other interesting papers, we find one by W. H. Edwards on the alleged abnormal peculiarities of *Argynnis myrina*, which was read before the Subsection of Entomology at the recent meeting of the American Association at Cincinnati. In this paper the author shows from records of careful observation that many of the remarkable statements made by Mr. Scudder on the abnormal peculi-

arities of this insect are incorrect. In the October number is a full description of the preparatory stages of *Thecla Henrici* by the same author; notes on an Aquatic Noctuid Larva, by J. H. Comstock, and descriptive papers by A. R. Grote, B. Neumoegen and Henry Edwards.

Bulletin No. 6, from the Department of the Interior, U. S. Entomological Commission, being a General Index and Supplement to the Nine Reports of the Insects of Missouri. By C. V. Riley; 8vo., pp. 177:

This useful pamphlet will add much to the value of the Missouri Reports, containing as it does a very complete index to all the matters contained therein. Following the introduction we have tables of the contents of the nine reports, then a list of errata, followed by a few pages of notes and additions; then follow descriptions of new species, descriptions of adolescent states, lists of illustrations, a copious general index and an index to plants and food plants.

On the Genera of Carabidæ, with Special Reference to the Fauna of Boreal America. By George H. Horn, M. D. From the Transactions of the Amer. Ent. Society, October, 1881, 105 pp., with eight plates:

In this paper the author dwells at some length on the value of the modifications of various organs of the body in the Carabidæ, for the purposes of classification, following with a complete classificatton of the tribes in this order, the points of difference being illustrated by examples in the excellent plates which accompany the text. Throughout this work there are many tables wherein the main points of difference are grouped in such a manner as to enable the student to readily recognise the many genera into which our numerous species are divided. This addition to our Entomological literature will prove a great help to Coleopterists, and only those who know the extent of this subject will be able to estimate the amount of labor and careful study required to produce such a work as that we have before us.

The Honey Ants and the Occident Ants. By Henry C. McCook, D. D.; 8vo., pp. 188, illustrated with thirteen plates, 1882:

This work, in the words of the author, is "a monograph of the architecture and habits of the honey-bearing ant, *Myrmecocystus melliger*, with

notes upon the anatomy and physiology of the alimentary canal; together with a natural history of the occident harvesting ants or stone-mound builders of the American plains." It is written in a charming and popular style, and the details of the curious habits of these interesting creatures are given in such a manner as to show that the author has studied them closely and is quite familiar with every aspect of the subject treated of, while the beautiful illustrations are a material aid towards the ready comprehension of the whole matter. This work is well worthy of a place in the library of every student of nature.

A Manual of Injurious Insects, *with Methods of Prevention and Remedy for their Attacks to Food Crops, Forest Trees and Fruit, and with a short Introduction to Entomology.* By Eleanor A. Ormerod, F. M. S., London, England, 1881:

It is with very great pleasure that we draw attention to Miss Ormerod's excellent work on Injurious Insects—the full title of which we have given above. It is the first effort that has been made in England to bring within the reach and comprehension of ordinary farmers and gardeners a complete account of the insect enemies that they have to deal with. The work begins with an introduction to Entomology, in which the reader is furnished with an account of the general life-history of insects during the various stages of their existence, beginning with the egg and going on through the larva and pupa to the imago. This is followed by a sketch of the classification of insects, based upon Prof. Westwood's division into thirteen orders, each of which is represented by wood-cuts of common species in order that it may be easily recognised by the reader. The book is divided into three parts, viz., Food Crops, Forest Trees and Fruit, with the insects that injure them respectively. In each part the various crops, trees, &c., are treated of as regards their insect enemies, in alphabetical order; for instance, the "Food Crops" begin with the Asparagus, Bean, etc., and end with Turnips, thus making it very easy to obtain information about any insect that happens to be prevalent. Every insect treated of in the book is made easily recognisable to the non-scientific reader by means of admirable wood-cuts, partly the work of the talented authoress herself, and partly reproductions of the beautiful illustrations in Curtis' Farm Insects. Each cut shows the insect in the various stages of its existence, while the letter-press gives an account of its life history. As

an example of Miss Ormerod's work we give two illustrations, selected almost at random :

P. 1—Asparagus Beetle, *Crioceris asparagi* Linn. (fig. 14).

Fig. 14.

Asparagus Beetle, larva and egg ; all magnified. Natural length of egg and beetle shown by lines.

P. 123—Onion Fly, *Anthomyia ceparum* Bouché (fig. 15).

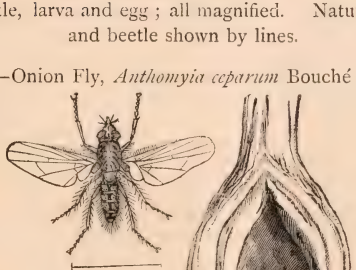

Fig. 15

Onion Fly, pupa and larva, all magnified. Onion-bulb showing pupa remaining in stored onion.

We cannot but congratulate Miss Ormerod upon the skillful manner in which she has accomplished her task, and we trust that her work will be fully appreciated by the farmers and gardeners of Great Britain, for whose special benefit it has been produced. The whole book is written in clear, simple language, free from all scientific terms and technicalities so far as they can be omitted, while the modes of prevention are such as have been

practically tested by competent persons, and cannot fail to be beneficial if intelligently followed. We hope to see many editions of the work called for, and to learn that the authoress has been amply rewarded for her labor of love.—[C. J. S. B.

Reports of the U. S. Commissioner of Agriculture for 1878 and 1879:

We have lately received copies of both of these valuable reports from the Department of Agriculture at Washington. There are in them, in addition to all the other useful papers on subjects relating to agriculture in the reports of the Entomologist of the Dept., much that is of great interest to Entomologists. In the report for 1878 we have, from the pen of C. V. Riley, Contributions on the Insects Injurious to the Cotton Plant; the Silk Worm, with Instructions for the Production of Silk; with descriptions also of a number of insects injurious to field crops and fruits, occupying in all fifty pages, and illustrated by seven full-page plates. In 1879, papers by J. H. Comstock on the Army Worm, Clover Insects, Insects Injurious to Orange Trees, and many other species which injure field crops, fruit and forest trees, occupying in all 75 pages, and illustrated by six full-page plates. This volume also contains an extensive report on insects injurious to the cotton plant, 84 pp., with 9 plates.

Ottawa Field Naturalists' Club:

The second volume of the transactions of this active body of naturalists is at hand. It is a neat pamphlet of 44 pages, 8vo., with one excellent plate illustrating a new species of *Porocrinus* from the Trenton lime stone, accompanied by a description, with some remarks on the genus by Dr. James Grant. In addition to the annual report of the Club, the volume contains the inaugural address of the talented President, James Fletcher, Esq.; a paper "On some Coleoptera Injurious to our Pines," by W. H. Harrington; one by Prof. J. Macoun, "On the Capabilities of the Prairie Lands of the Great North-west, as shown by their Fauna and Flora," and other interesting contributions. We congratulate our Ottawa friends on the good work they have done this year, and sincerely hope that their active efforts may have the effect of promoting a general love for natural history among the residents of the capital of our Dominion.

North American Moths, with a Preliminary Catalogue of Species of Hadena and Polia. By A. R. Grote, 8vo., 20 pp.; from the Bulletin of the Geological and Geographical Survey of the U. S., Vol. 6, No. 2:

In addition to the catalogues, this paper contains descriptions of twenty-eight new species.

The Insects of the Clover Plant. By J. A. Lintner, 8vo., 17 pp., with six cuts :

This excellent paper forms part of the fortieth annual report of the New York State Agricultural Society, and contains detailed descriptions of the insects most destructive to clover, with references to all the species known to feed on this plant.

PERSONAL.

It will interest our readers to know that our eminent American Coleopterist, Dr. John L. LeConte, of Philadelphia, has recently been elected an honorary member of the Deutsche Entomologische Gesellschaft. The number of members of that grade seems very restricted, for there are but seven others in the last catalogue, of whom the venerable Westwood is the only English-speaking one.

Mr. B. Pickman Mann, late of Cambridge, Mass., and so well known as editor of Psyche, has been appointed assistant Entomologist at the Department of Agriculture, Washington. His many correspondents will please bear in mind that his address in future will be Dept. of Agriculture, Washington.

Mr. K. L. Bramson, Member of the Imperial Society of Naturalists, of Moscow, who resides at Exaterinoslaw, Russia, desires to procure specimens of American Diurnal Lepidoptera, for which he offers in exchange European Coleoptera, Hymenoptera, Diptera and Lepidoptera. He has sent a list of his duplicates to the editor, who will be glad to send it to any one who may wish to make exchanges with this European Entomologist.

We have lately been favored with two letters from one of the founders of our Entomological Society of Ontario, Prof. H. Croft, formerly of Toronto, but now engaged in sheep farming in Texas, with his son, at Hermanitas Ranch, San Diego, Duval County. His many entomological friends will be glad to learn that he has carried his enthusiasm for natural history, and especially for insects, with him to his new home, and has promised shortly to send a communication on some of the Texan insects

for the ENTOMOLOGIST. He speaks enthusiastically of the many beautiful butterflies to be seen on the wing in that southern latitude, and refers also to some diabolical Hymenoptera, the females of which are wingless, that sting horribly; of another large species which kills and carries off the Tarantula, and other interesting insects. He says: "During the summer we had thousands of *Elater noctilucus*, also quantities of *Lampyrus;* the light of the former is much more blue, brilliant and persistent."

OBITUARY.

It becomes our sad duty to record the death of one of our much esteemed fellow-laborers in the Entomological field, J. D. Putnam, of Davenport, Iowa. Mr. Putnam had long taken an active interest in the Davenport Academy of Natural Sciences, and had for some time past held the position of President of that active association of naturalists. He was with us at our late meeting in Cincinnati, and took part in the proceedings of our Entomological meetings, where his uniformly courteous, affable and gentlemanly bearing endeared him to all who had the opportunity of forming his acquaintance. Notwithstanding that he has been for some years in delicate health, he has written some valuable papers on Entomology and Mineralogy. His removal will be deeply regretted by all who have been privileged to know him, and particularly will he be missed by those with whom he has labored in the Academy at Davenport. When parting in Cincinnati we had sincerely hoped to meet again, but it has been otherwise ordered: he has been taken from a noble field of labor below, to, we trust, a nobler one above.

CORRESPONDENCE.

DEAR SIR,—

I have lately received a specimen of *Macrosila cingulata* Fab., captured at Long Point. It is about the dimensions of a medium-sized *quinquemaculata*. The spots on the body pink, and a pink patch on the hind wing. I see in connection with it that it feeds on the Sweet Potato, indicating that it was originally a more southern species.

J. ALSTON MOFFAT, Hamilton, Ont.

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